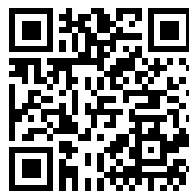


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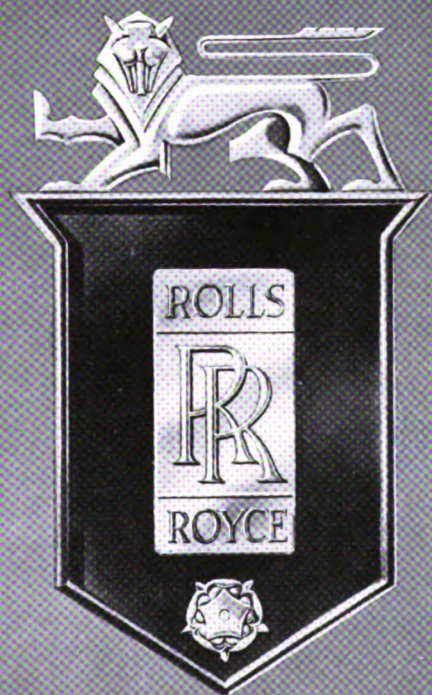
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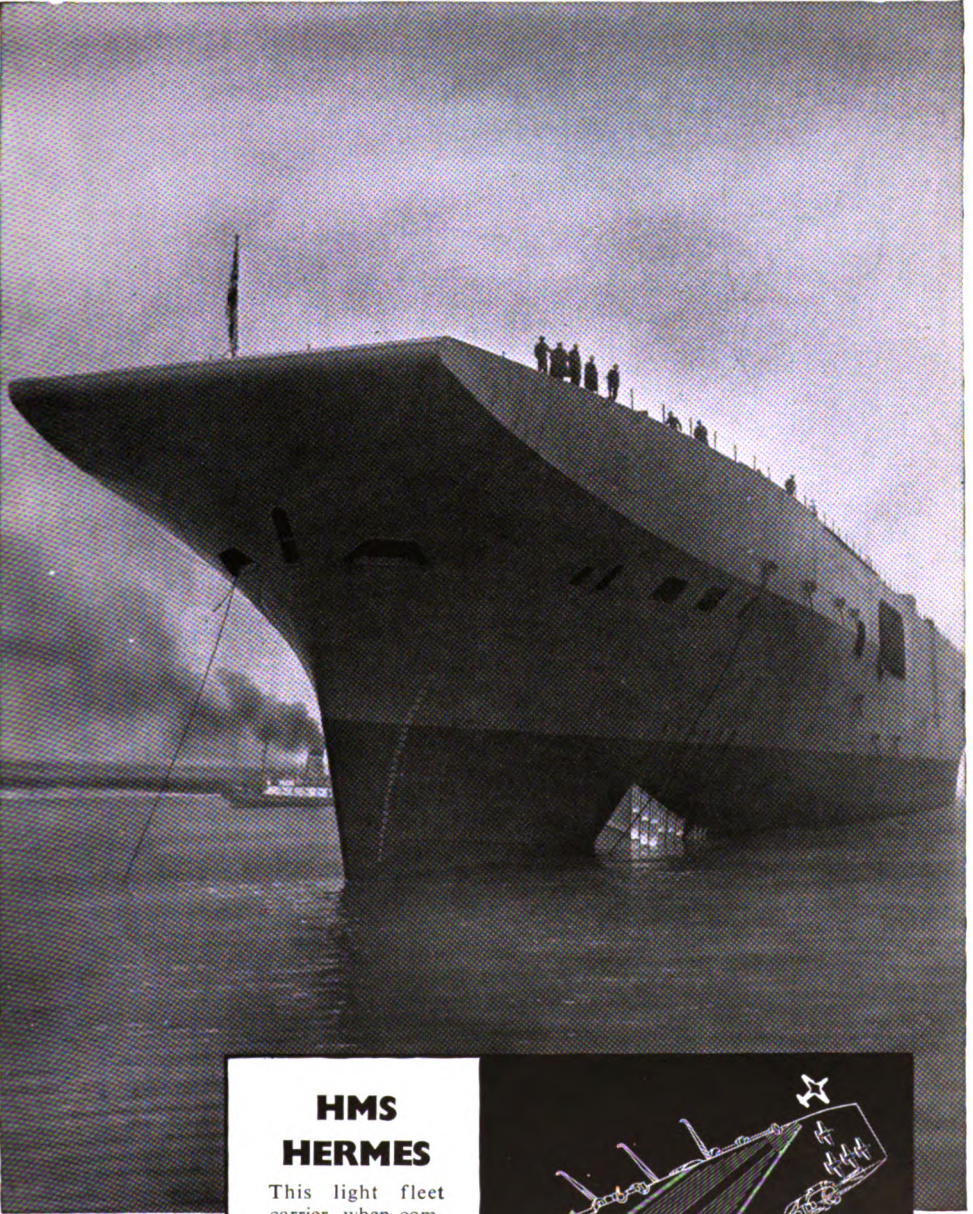
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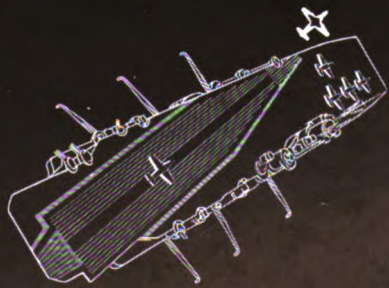
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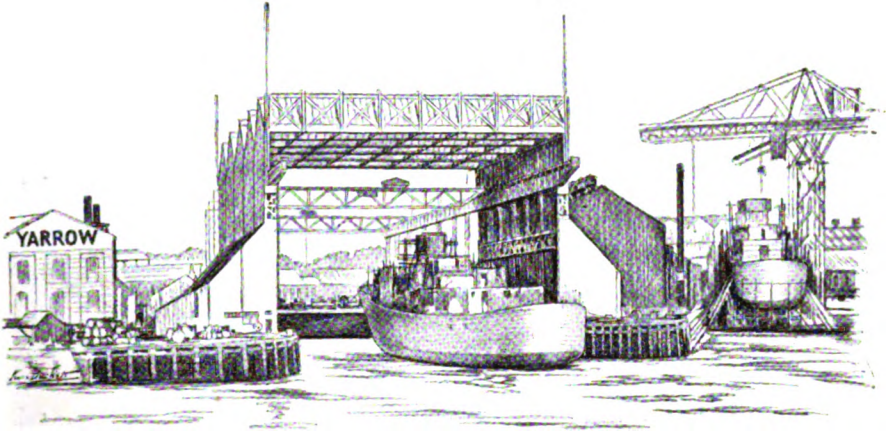


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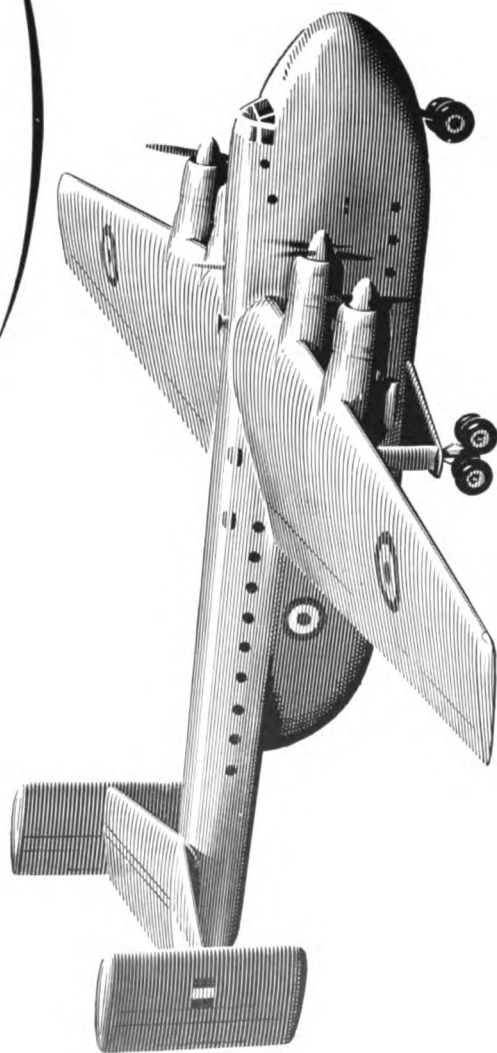
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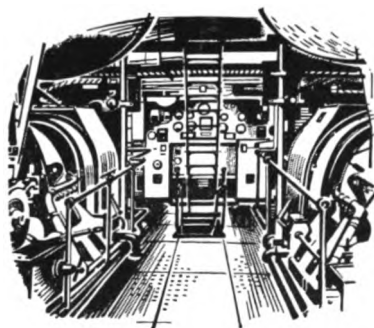
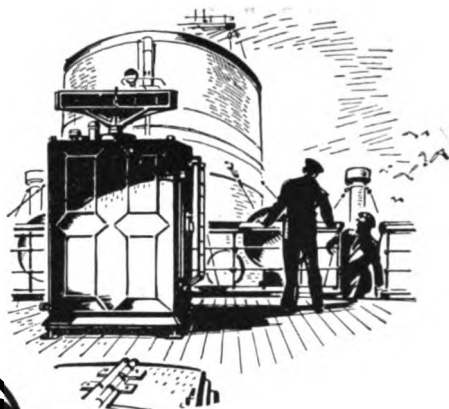
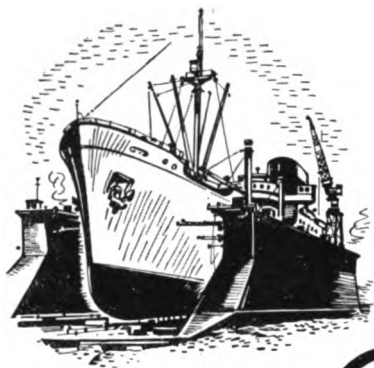
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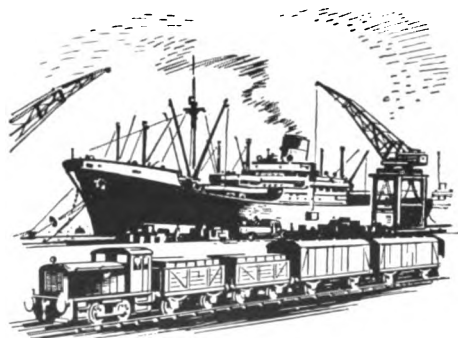
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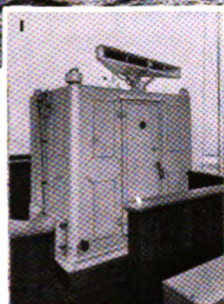
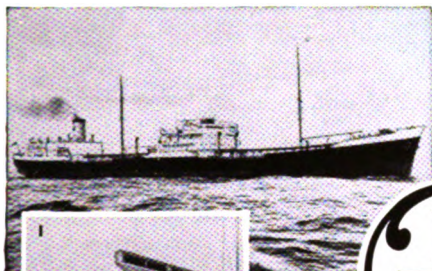
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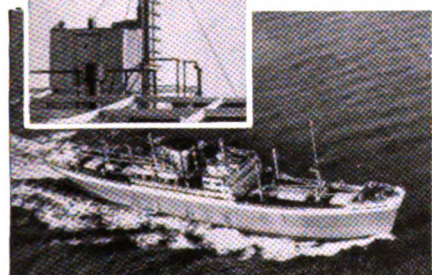
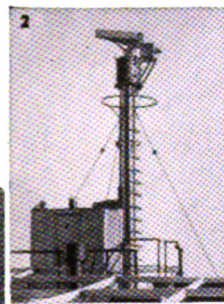
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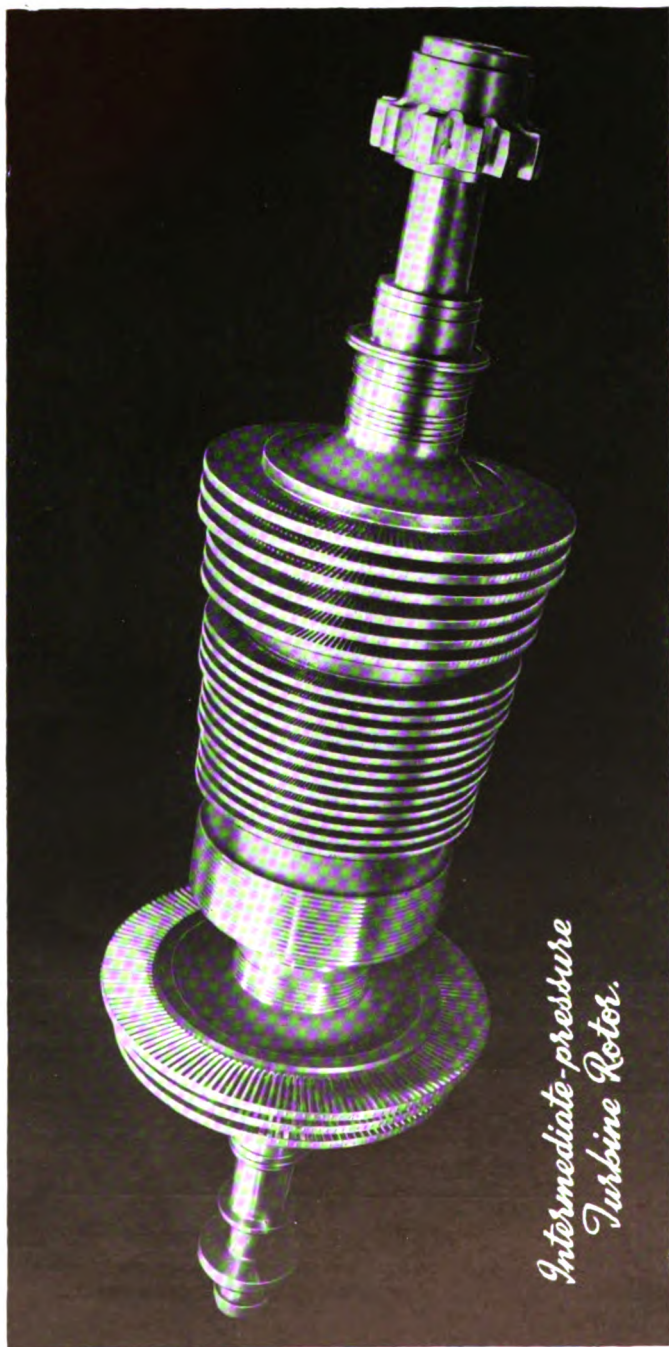
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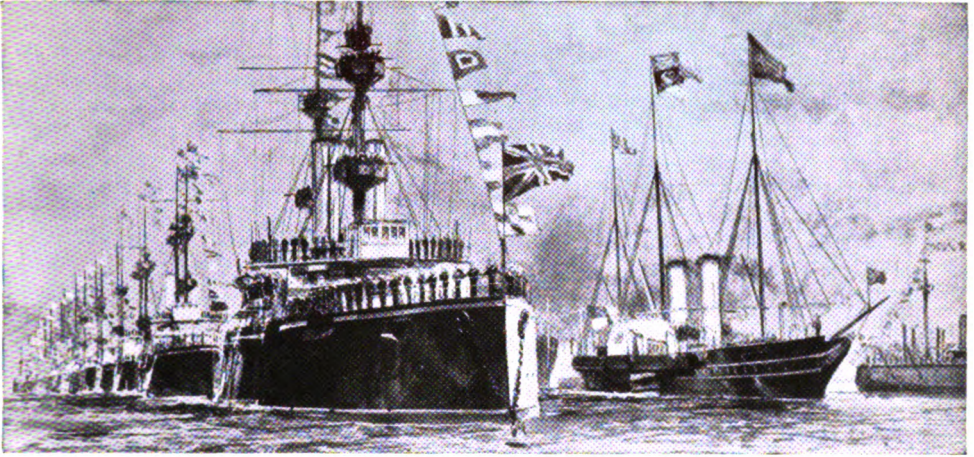
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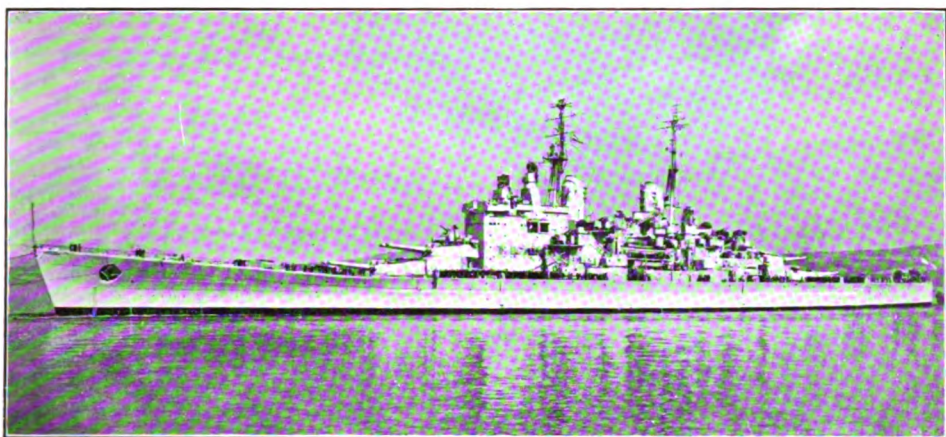
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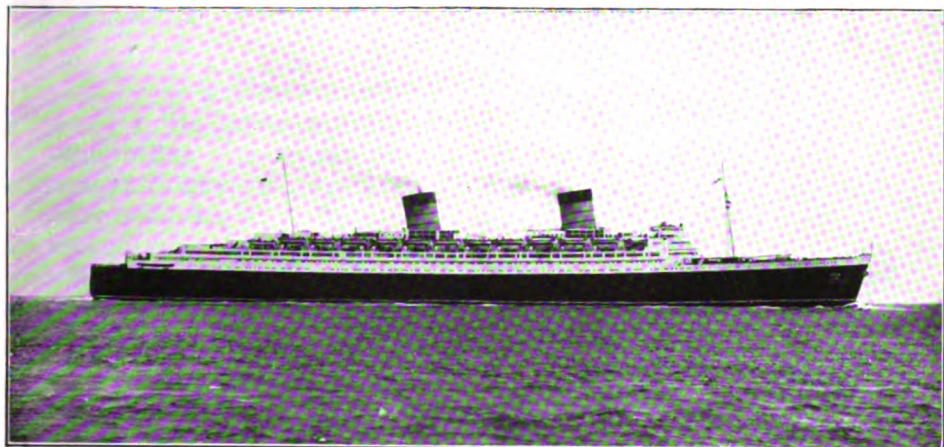
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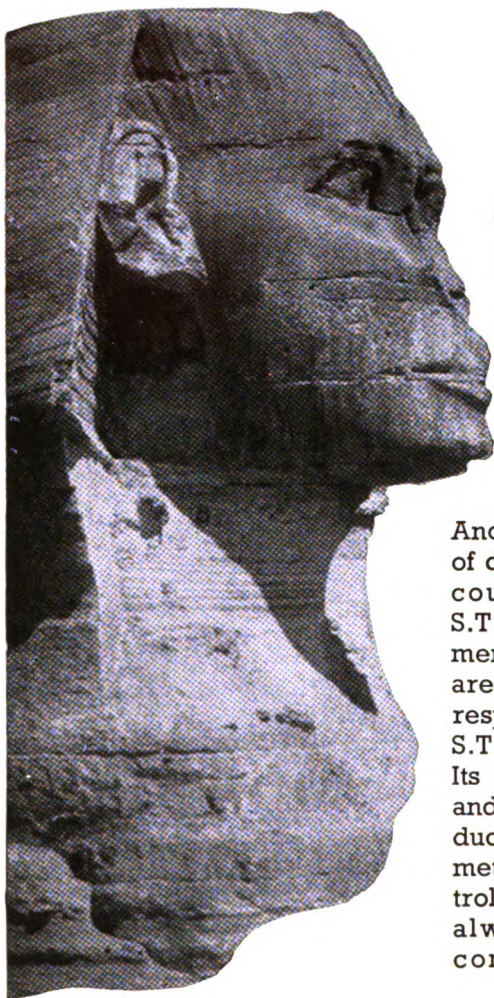
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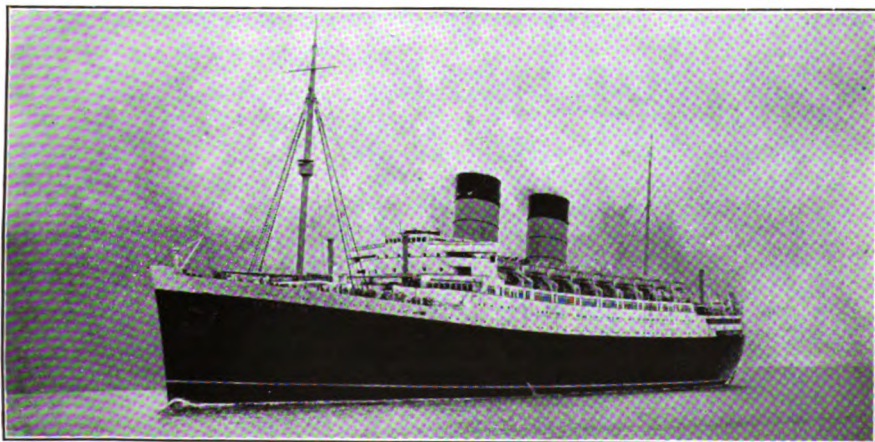
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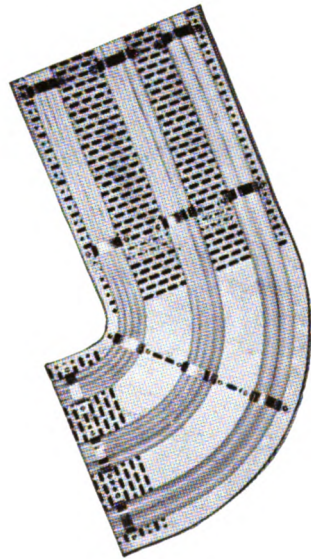
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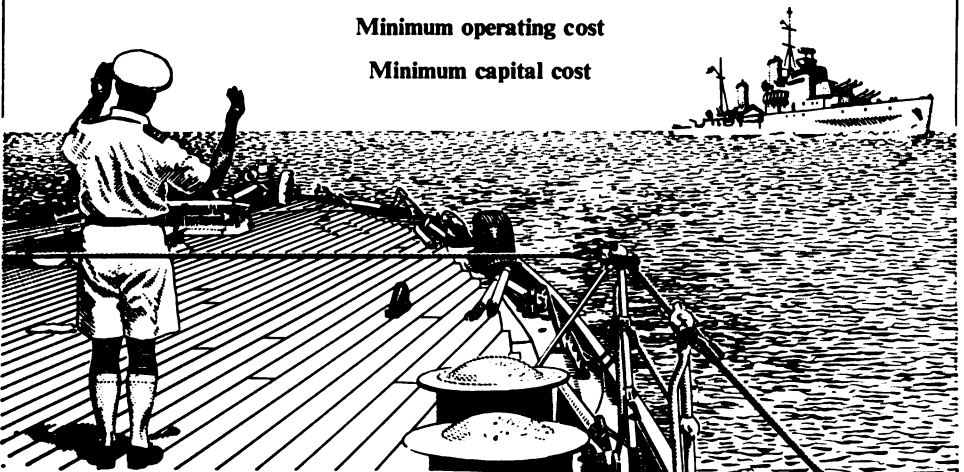
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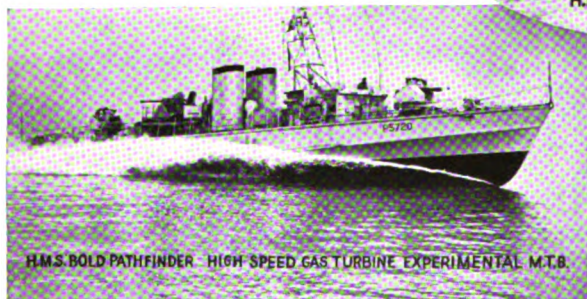
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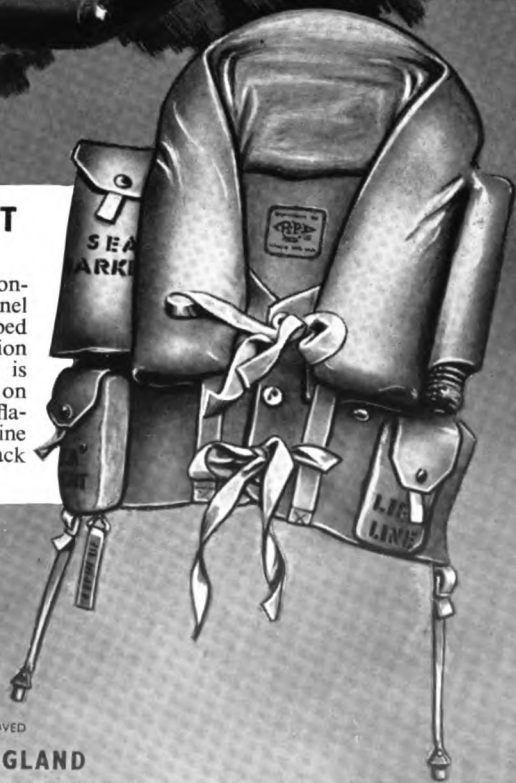
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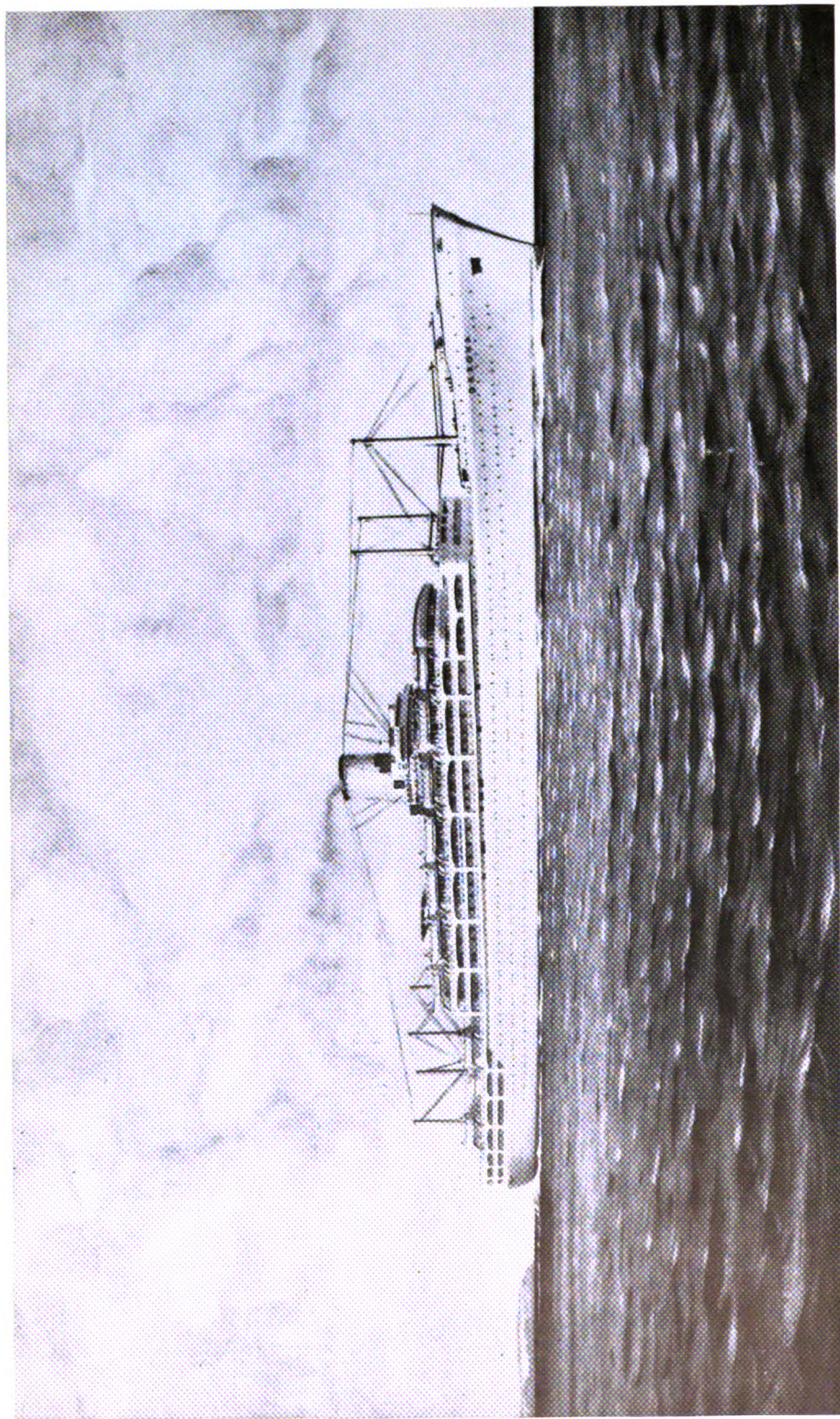


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## PREFACE

THE international situation, upon which all defence and strategical problems depend, has been in a state of great change while this issue of "Brassey's Annual" has been in preparation. The death of Mr. Stalin, and the apparent signs of some change in the Russian attitude of maintaining international tension, occurred while the chapters that follow were being written. Since they have been in type the fighting in Korea has been suspended; as these words are being written, the Anglo-Egyptian discussions, which so profoundly affect the Defence situation in one of its most important theatres, have been resumed, though the course they are taking has not been made public. It may well be that by the time this volume is published the world situation will have been transformed. But even so—and it may equally well be that there will be little basic change in it—that does not invalidate the discussions of the defence and strategical problems that are to be found herein. They are not susceptible to exact solutions, as of algebraic equations, accurate to the exclusion of all others. Their solutions are reached through a process of discussion, which takes account of various views and opinions, on technical as well as political and strategical questions. It is not the object of "Brassey's Annual" to present to its readers pontifical judgments upon these questions; it is rather to place before them some of the various arguments and factors that must be taken into account in reaching a judgment. We consequently sometimes have occasion to present arguments from different writers whose views are opposed to one another. One such contrast is to be found between some of the arguments presented in Chapters III and X, another between those in Chapters XI and XII; and all readers whose recollections go back to the World Wars will recall instances of similar differences respecting the problems that then arose—some of them are recalled by Professor Blackett in his recollections in Chapter IX.

There is no change in the policy of "Brassey's Annual" or in the objects with which it is conducted. Its aim is to present to readers who are interested in Defence policy and problems a balanced review, year by year, of their development, and a survey of the material progress of the Armed Forces. Service readers, it is hoped, will find interest in the articles dealing, from time to time, with aspects of the Services other than their own which are of importance, but little known, outside the Service concerned—one example is the chapter in this issue on "Naval Signalling". It also aims at emphasizing the essential unity of the Services as partners in the single Defence Team.

Brigadier Barclay has again taken charge of the section dealing specially with Army matters, and Air Vice-Marshal Yool of the Air section.

H. G. T.

**IN this, the Coronation Year issue of "Brassey's Annual", the Armed Forces Year-book, the editors, publishers and all connected with its production beg to tender to Her Gracious Majesty, Queen Elizabeth II, Head of the Armed Forces of the Crown, their humble duty; and they echo the responses of the Coronation Service,**

**"LONG LIVE THE QUEEN"**





Her Majesty Queen Elizabeth II

*(Portrait by Dorothy Wilding)*



**BRASSEY'S ANNUAL  
THE ARMED FORCES YEAR-BOOK**









## CHAPTER I

### THE OFFICER AND HIS HIRE

BY THE EDITOR

ONE EFFECT of the occurrence of two world wars in the space of a single generation has been to accelerate social changes, in this country and others of western Europe at least, which might well have taken several generations to mature if the 20th century had been no more warlike than the 19th. Such changes bring many difficulties in their wake, and to no institutions are the difficulties more acute than to the Fighting Services. Service problems do not differ in kind from those in other spheres of the national life—that is to say, they are basically economic, or at least spring from economic sources. But they do not present themselves, to those charged with the conduct of the Armed Forces, as economic difficulties; for the Services are neither economic institutions—except in the very remote sense that they are maintained as a form of insurance against economic damage to the nation by the Queen's enemies—nor are they established or administered on economic principles. It is this paradox, perhaps, which is in large part responsible for their special difficulty.

The problems of the Services to which the social changes of the day have given rise are, of course, problems of man-power. The primary problem in that sphere, of how to recruit the total numbers demanded by the needs of defence as defined by the international situation of the day, is not the chief; nor indeed is it specially difficult of solution. When the danger of war is as manifest as it has been for the last few years, no party—in this country at least—is disposed to oppose resort to compulsory national service when voluntary recruitment fails to provide forces of the strength which all recognise to be necessary for the national safety. But compulsion cannot provide the Services with the officers, or indeed the petty and non-commissioned officers, that they need if they are to be capable of fulfilling the functions for which they exist. And since another of the problems of the day is concerned with providing those indispensable members of the Services, of the quality and in the numbers that the Services need them, other means of solving it have to be sought. It is the supply of commissioned officers, rather than of petty or non-commissioned officers, which is chiefly affected by the social developments to which attention has been drawn above; and though the two problems are cognate they are very different in many respects, certainly in degree and to a large extent in kind also. They thus call for separate discussion.

The changes that have affected the officers of the Armed Forces, serving and pensioned, but perhaps more severely the latter are not only social; they are also financial. Moreover, the financial difficulties that the changes have brought in their train are all the more burdensome by reason of the results of social developments. The latter have completely swept away the conditions by virtue of which the Armed Forces relied for their officers chiefly, though not exclusively, upon the well-to-do classes. The majority of the officers of today are by no means

independent—as the majority of officers were before the first World War—of their Service pay; on the contrary, they are drawn from all classes in the financial scale. This, few will be found today to disagree, is as it should be, for the qualities which are needed in the officer—which the officer must possess, indeed, if the Services are to reach that standard of full efficiency which is indispensable to the defence of the realm—are not the monopoly of those who are endowed with a measure substantially above the average of this world's goods. The Services must be able to draw their officers from every source where those of the requisite standard, of ability, education, and personality, are to be found. But that means that they are now in competition with every other profession in the land for the services of the comparatively small proportion of the population who form the *élite*—as measured by intellect and ability—from whom leaders in every walk in life are alone to be found.

That being so, it is incumbent on those on whom falls the duty of framing the national policy and conducting its administration to ensure that the economic and financial circumstances of the officers of the Services shall not be markedly inferior to the general standards of other professions. It is not perhaps necessary that the Services should hold out to their officers the prospect of financial rewards as great as those that are attainable in some other professions—in which there are a few great prizes—or in financial and industrial pursuits; for there are many other considerations besides that of monetary return that weigh with those who make the Services their life's work. Those considerations—which are examined later—undoubtedly outweigh the disadvantages of a rate of remuneration which is rather below the general professional standard. But the permissible margin in this respect is small, and broadly speaking Service pay must keep pace with that standard, taking all the elements of it into consideration. That it has not done so of recent years must be obvious to all who have followed debates in Parliament and correspondence in the press in the last few years.

The subject is, of course, greatly complicated by the fact that members of the Services, both officers and men, receive various benefits, in addition to their monetary wages, which are held to compensate them for the fact that the latter are below the general professional standard. They are eligible to earn a non-contributory pension on conclusion of their active service, which is commonly at an age substantially earlier than that at which the professional man expects to retire. They receive rations when serving, or, when they are not drawing rations, receive a subsistence allowance which is supposed to come to the same thing—though it very rarely does! Accommodation is on the same footing, balanced by a lodging allowance—which also rarely comes up to the actual expense of obtaining accommodation—when they are perforce unprovided with Service quarters. Up to the establishment of the National Health Service, the fact that they received free medical attention, in hospital if necessary, was also held to justify part of the discrepancy between Service and civilian incomes. In certain circumstances, the widows of officers could, subject to a means test, be granted pensions—but only, until this year, on a scale fixed 300 years ago, and barely above its equivalent now. It is exceedingly difficult to determine what is a fair equivalent, in terms of money, for these various advantages enjoyed by the officers and men



of the Services, and naturally enough, the official estimate of their value, put forward by Government spokesmen in Parliament whenever the officers' case has been raised in debates on the Service Estimates, has been much higher than that reached by the officers themselves, who have the job of making the money actually go round. And the very complexity of the system of Service remuneration has in the past told heavily against the officers; since it has enabled those whose duty it was, in the interests of avoiding extravagance in the administration of public funds, to oppose unjustified increases in the charges on the national revenue through the Service Estimates, to raise innumerable side-issues in the maze of which the move to amend actual and real disabilities has been either postponed or lost altogether.

On the other side, officers of the Services have been subject to certain liabilities, and even hardships, which are quite foreign to any civilian profession. Whereas the civilian can look forward to returning every evening to a fixed home and his own family, the very nature of service in the Armed Forces involves long periods of separation from home and family, frequent changes of station, often from one side of the globe to another, and the impossibility of establishing any fixed abode. The officer, therefore, and particularly the naval officer who cannot in any circumstances take his family to sea with him in his ship, is therefore faced with the alternative either of maintaining two establishments or of undertaking the trouble and expense of constant removals of his home from one place to another. In recent years, these special expenses have been acknowledged by the authorities, and monetary allowances have been authorised to cover them. How far these allowances are adequate for that purpose is, not unnaturally, a point upon which there cannot be said to be entire agreement between the authorities and the officers themselves; but whether or not the allowances are fully adequate to their purpose, the officers today have certainly been relieved—to a large extent, if not altogether—from the direct financial charges in respect of a family home imposed on them by the conditions of service in the Armed Forces.

That is not the whole story, however, even if the considerations involved were capable of being reduced accurately to figures of pounds, shillings and pence; because the men who go into the Armed Forces are not concerned merely to make a living and do not look on the Service merely as one profession like any other. If they did, it would be necessary not only to refund to them the extra living expenses to which they are put by the conditions of Service life, but to pay them a salary higher than that of their civilian counterparts, in order to compensate them for the harder conditions involved in frequent and prolonged separation from their families. It is the general experience in other walks in life that such conditions of hardship demand a higher rate of remuneration than forms of employment that do not involve them, if they are to be sufficiently attractive to the type of person needed; but it is not the experience in the ranks of the Services. Probably many who enter the Services in their teens do so because the Armed Forces appear to them just one profession like another, and because they are attracted by the prospect of an active life and "seeing the world." But those who enter at a more mature age, and all of them when they reach the same age after entering earlier, realize that the members of the Armed Forces, and particularly the officers,

must be actuated by a sense of duty, loyalty, and service far more than by the mere desire to make a living for themselves.

I say "particularly the officers" because, although many of the remarks which follow apply to all members of the Armed Forces, whatever their rank and status, the arguments based on the circumstances and experiences of those of commissioned rank do not all apply without elaboration to the case of the men. Space does not permit of my extending this analysis to the latter as well, and I therefore write only of the case of the officers; but I must not be taken as claiming for them a monopoly of the virtues, and altruistic motives, which are the marks of all those who devote their lives to the defence of their country.

The officer, like all his comrades and subordinates, when he enters one of the Armed Forces accepts the obligation to devote himself to the service of his country; but in addition to that, it is his first duty to be the leader of his men, and he owes a duty to them as well as to the Service of which he is a part and to the Country which it is his duty to defend. It does not suffice, as I wrote in this Annual last year, for him merely to be able to enforce through the power of punishment that obedience which is indispensable in the conduct of warlike operations, though a disciplined Service must always retain some sanction in ultimate support of its officers' orders to their subordinates. For the officer to be the real leader of his men, he must command both their confidence and their loyalty—they will never give their loyalty to one in whom they have not confidence. But loyalty is not one-sided; it must be mutual if it is to exist at all, and the inexperienced officer very soon learns—if he does not know it already through family tradition or proper training—that the loyalty of his subordinates is only to be gained through his own loyalty to them. It is, indeed, an element of their confidence in him. Subordinates who know that their officer will stand behind them in difficulties, and take the responsibility of them rather than seek himself to escape blame for any mishap by putting it on a junior, will give him of their best at all times.

The officer especially, that is to say, is a man actuated by a high sense of duty and loyalty to the Service of which he is a member, and to the service of his country which it is his duty to defend, even to the death. That attitude of mind is, on the whole, very rare in the industrial and commercial worlds—though none should maintain that it is never to be found there—in which most of those who make up those circles are concerned chiefly with their personal well-being, prospects and ambitions. To point this out is not to assert that the latter considerations have no weight in the Services; on the contrary, the ambition to rise to the head of one's profession is just as widespread, amongst those who feel that they have it in them to achieve those heights, in officers of the Services as in any other profession. But the officer can only pursue that ambition by excelling in the qualities which, as defined above, are the indispensable ingredients of real leadership; by basing his conduct, that is to say, on the ideal of service rather than the pursuit of personal advantage, present or prospective. That ideal tends to preclude any pertinacious agitation in favour or even advocacy of amelioration of his own remuneration or conditions of service—nobody ever heard of a strike for higher pay by officers of the Armed Forces, for instance, and there is no means, comparable to the Trades Union in industrial life, whereby such joint action

could be organised. The whole atmosphere which is represented by the Trades Union theory, indeed, is foreign to that in which the officer of the Armed Forces has his being. This tradition was very well expressed by Admiral of the Fleet H.R.H. the Duke of Edinburgh in a speech delivered to the Naval Cadets to whom he was presenting prizes recently on their passing out from the training cruiser, H.M.S. Devonshire, in which he said :

Service in the Navy is a privilege enjoyed by those who prove themselves capable of discharging satisfactorily the duties imposed upon them. Promotion is not a question of jobs for the boys ; it is a competition of service in the interest of the Navy and the country.

If this characteristic of the officer were generally recognised by our rulers, it would surely be incumbent on them to be generous in the provision made for him ; yet a study of the manner in which successive governments, in the last two centuries, have dealt with the subject of Service pay and emoluments makes it impossible for anyone to maintain that they have. On the contrary, the matter has often been approached in a spirit which can only be described as mean and cheeseparing ; and even when public opinion has been so deeply stirred that some amelioration could not be avoided—as in the years succeeding the first World War—increases have been screwed down to a bare minimum, lower than that recommended by the official committees which have gone into the figures in detail. In support of this sweeping accusation, I need only instance what happened in the matter of naval pay in the period cited, when the Admiralty appointed what was known as the Jerram Committee to examine the current rates—which were universally realized to be nearly a century out of date and grossly inadequate—and to draw up new scales which should be adequate to the needs of the day.

The Jerram Committee duly made its recommendations, and produced scales of naval pay for all ranks which, had they been approved and adopted by the government of the day would have been regarded in the Navy, not indeed as lavish, but fair, in view of the rather general assumption prevalent at that time that further wars, for some generations at least, were unlikely, and that a long period of peace was to be expected, sponsored and maintained by the newly-invented League of Nations. But the Jerram Committee made a serious tactical error in formulating its recommendations. The Services at that time were not charged the full rate of Income Tax on Service pay ; they paid Income Tax at about half the standard rates—a concession which was the sole recognition by Government authorities during the war which had just ended that Service pay did not cover living expenses. The Committee drew up their new rates on the assumption that the Income Tax concession would remain in force, adding a rider to the effect that, should it be withdrawn so that the Services paid the full civilian rate, the pay rates should be correspondingly increased. That form of recommendation unfortunately gave the Government financial advisers the opportunity to whittle away the increases recommended, while maintaining a colourable appearance of generously accepting them. The new pay scales were approved and made applicable to all three Services, but the rider was ignored, and the Services at once put back upon the standard civilian rates of Income Tax. It is

presumably the duty of the Treasury and its officials, as guardians of the public purse, to take every opportunity of checking waste or extravagance; and every Chancellor of the Exchequer naturally welcomes any measure that enables him to reduce the total demands on the Exchequer. But it is hardly surprising that the officers of the Navy felt on this occasion that they had been made the victims of a shabby manœuvre.

Nor was that the only shabby manœuvre of the time. For it was decreed that, of the increases in pay then authorised, 20 per cent. was to be regarded as compensation for the recent increase in the cost of living, and that that fraction should be varied, up or down, in step with the cost of living, as measured by the "Index" produced by the Board of Trade. There were two injustices perpetrated by that decree. In the first place, there was no justification for the implication that the Jerram rates would have been less than they were but for the high cost of living in 1919 when they were drawn up; for in fact the cost of living had risen by more than the increase the Committee recommended. The second injustice was that the Cost of Living index then current was based upon a working man's budget, having been devised as a yardstick wherewith to measure industrial wages; and it took no account of many liabilities to which officers were subject—such as house-rent, school fees, etc.—unless they were to base their standard of living upon the standard appropriate to a workman in an industrial city. Possibly those holding the equalitarian theories so popular in certain political circles today may think there is no reason why they should have aimed at any higher standard of living; but that was not accepted anywhere at the time, even in the lower ranks of the Services themselves. Officers were expected to maintain a certain standard of dignity, not lavish in any way, but in nobody's view was it based on the standards of the industrial wage earner. It is hardly surprising that those officers possessing little or no private means—who formed a much larger proportion of the whole than they had a generation earlier—felt a sense of grievance at being expected to maintain a certain standard while being denied the means of doing so.

In accordance with the sliding scale thus defined, reductions were made in pay rates in the next 15 years, during which the cost of living, as measured by the Index, steadily fell; and this development led to yet another injustice. For in 1935, just as the cost of living showed signs of rising again, the sliding scale was abrogated, and the rates of pay—and pensions—were stabilised, not indeed quite at the lowest point they reached, but only just above it; and at that figure the pensions, except of those who had the opportunity of augmenting them by service during the second war, have remained ever since. Since the actual cost of living has multiplied several times since 1935, the injustice of that action needs no demonstration; indeed, it was castigated in no uncertain terms by many speakers in the House of Lords on January 20 last. It is true that the numbers affected are few, and become fewer every year as the older of them die off, sometimes in poverty. But the injustice persists, and it is desirable that the cumulative effect of it, of the others that I have quoted, and of many others of a list too long for inclusion here, should be examined and realized.

Before doing so, it may be of interest to speculate upon the genesis of the ungenerous—to say the least of it—treatment of the members of the



Armed Forces. It is no new thing; indeed, it may almost be considered a national tradition, certainly from the 18th century, as much contemporary doggerel illustrates. The men of Hawke's fleet in 1760, the year after the Battle of Quiberon Bay, complained in a popular ballad:

Ere Hawke did bang  
Moonseer Conflans  
You sent us beef and beer.  
Now Frenchie's beat  
We've nought to eat  
Since you have nought to fear.

Nearly half a century later, the seamen of the fleet who mutinied at Spithead wrote in their petition to the Admiralty:

The first grievance we have to complain of, is, that our wages are too low, and ought to be raised, that we might be the better able to support our wives and families in a manner comfortable, and whom we are in duty bound to support, as far as our wages will allow.

A grievance very well justified since seamen's wages still stood at the figure of over a hundred years earlier. A hundred years later still, Kipling was moved to write:

For it's Tommy this and Tommy that, an' "Chuck him out the brute."  
But it's "Saviour of 'is country" when the guns begin to shoot.

It is not difficult to discern the basic cause of the grievances thus ventilated. It was clearly the national habit of regarding the members of the Armed Forces, during peace, as idlers battenning on the country, to whose prosperity and resources they themselves are contributing nothing.

There may have been some justification for that point of view at a time when the profession of arms was one which called for no particular experience or training, when any man could turn soldier and in a few weeks be as good a soldier—or indeed "landsman" in a man-of-war, who made up a large part of her company—as one who had been a fighting man for years. The tradition, however, seems to have lingered on long past the time when the Armed Forces developed into professions as complex, and as skilled, as any in the land. If the "*levée en masse*" was a force as efficient for the defence of the realm as any professional army, there was little justification for the maintenance of the latter in time of peace—hence the traditional British dislike of a "standing Army" which is reflected today in the fact that the Army Act is an annual measure, for the period of one year only. Today, however, it is a meaningless survival, so far as it survives at all. Yet apparently it does survive, even if almost unconsciously; for there can be no other explanation of the refusal of the present Government, which cannot be regarded as oblivious to the need for maintenance of adequate Defence Forces of the Crown, to remedy the glaring and admitted injustice done to the pre-1935 pensioners, and their reluctant and inadequate concessions recently made in the matter of the pensions to officers' widows.

There has been of late years, and particularly since the end of the late war, a decided improvement in the rates of remuneration of the Armed Forces, for which recent Governments must be given credit. Service pay has been brought up to levels comparable to those prevailing in civil life, and the rates for officers have perforce kept pace with the increases

granted to those in the lower ranks—though not, as some writers have pointed out with considerable emphasis, to the same extent as in the Civil Service! Yet still difficulties are being experienced in obtaining sufficient numbers by voluntary recruitment, to the extent that the Admiralty last year were compelled to appoint a committee to advise upon how the necessary numbers could be induced to come forward. At the time of writing, the report of that committee has just been issued, in a pamphlet of 114 octavo pages, of which about four are devoted to examining the “career prospects” of the naval officer. The committee demonstrates that, at the rates now ruling, for the moment the naval officer’s “career prospects” compare quite favourably with those of other professions, and recommends that the Admiralty should make more of this in their efforts to attract the entry of those that they need for officers. But, curiously enough, it fails to take any note of the grievances of past generations of officers—and of lower ranks as well—who have seen conditions which were fair, if not generous, when first established, maintained, without amelioration, when the social and economic conditions have so altered that they have become far below current standards. It is at least arguable that the treatment meted out to, for instance, the pre-1935 pensioners throughout a period in which Civil Service pensioners have received three increases, may have operated to undermine confidence that officers of the Armed Forces will receive adequate consideration should they too, in their turn, be sufferers, in the evening of their lives from changes in social conditions over which they have no control.

To sum up, it must be realized that there is in this country, unfortunately, a long tradition of mean treatment of those who have actually deserved well of their country; and that there are a number, small and dwindling though it be, of men who today are suffering grievously from the latest examples of action that has contributed to the survival of that bad tradition. The officer today is, for the moment, recognised as being worthy of his hire, and is therefore receiving hire which is, if no account is taken of his liability to serve his country even to the death, adequate to the duties he is called on to perform. But unless our rulers give a convincing demonstration, by redressing the injustices under which a number of past officers now suffer, that the bad old tradition has passed away, and that their successors will not in their turn be treated with meanness in their old age and need, the difficulties in the way of recruitment of officers, in the numbers and of the quality that the Armed Forces require, are likely to persist.

H. G. T.

## CHAPTER II

### THE SERVICES IN 1952-53

By MAJOR-GENERAL D. A. L. WADE

THE PAST year marks a turning-point in the progress of re-armament. The present is, therefore, an opportune time to pause awhile and survey the crowded events of the last two and a half years. During this period successive British Governments have whole-heartedly applied emergency measures to repair the serious breaches in our defences caused by the rapid post-war demobilisation of the Services and armament industries. Events in South-East Asia and China from 1948 onwards provided warnings of the dangers which lay ahead. These warnings passed largely unheeded. Over two years elapsed before events in Korea opened our eyes to the full dangers which confronted not only Great Britain but the whole free world. It is true that in this period the North Atlantic Treaty was signed and the foundations of Western defence were laid, but it needed the violent impetus of Korea to start the nations party to that treaty along the road of re-armament. The United Kingdom and the United States set the pace; the others followed. In Britain the period of national service was extended from 18 months to two years; the so-called £47,000,000,000 3-year programme was launched; large numbers of reservists were recalled to the colours and men due for release were compulsorily retained in the active Services; by introducing improved conditions of service and increases in pay steps were taken to augment the regular, as opposed to the national service, components of the Active Forces. These measures have enabled us to face the strains and stresses of the last two years. One can now survey the state of our defences with some satisfaction, whilst taking measure of the tasks which still lie ahead.

The strength of the Active Forces has probably now reached a peak compatible with the available man-power resources. The output of weapons and equipment from the resuscitated war industries has grown from a trickle to a steady flow. The recently re-formed army formations and air squadrons have reached a state of preparedness which would allow them to give good account of themselves in war. Last autumn the first British atomic weapon was successfully tested off the North-West coast of Australia.

These are the highlights of the defence picture. There remain some sombre shades. Naval strength remains relatively weak, though the quality is as good as ever. Naval aviation is heavily handicapped by the lack of modern aircraft. Supplies of new arms and equipment are not yet sufficient to meet the needs of the reserve divisions of the Territorial Army. The re-equipping of R.A.F. squadrons with the latest types of aircraft has only just started.

The overall situation was well summed up by "The Daily Telegraph" (March 19, 1953) when, referring to the parliamentary debates on the Service Estimates, it wrote:

The picture is far from being wholly reassuring. The greatest shock to any complacency was the announcement by the First Lord of the Admiralty when he revealed that Russia has today the second largest navy in commission in the world.

The shooting down of a British bomber by a Russian fighter superior to any that we could put in the air to match it underlines the gravity of the Government's statements in the debate on the Air Estimates. The British position with regard to aircraft is that we have had jam yesterday—Spitfires and Hurricanes, Lancasters, Halifaxes, and Mosquitoes—and we shall have jam tomorrow, with Hunters, Javelins, Valiants, Vulcans and Victors, but we have no jam today. The problem of getting our superbly designed aircraft into production before they become obsolete must be the dominating question for the Government.

The Army is equipped as well as it ever has been, but even with National Service a British army can never be large enough for all the tasks it may be called upon to do. This makes it the more necessary that the task should be shared by all three Services as a balanced whole.

The emergency repairs to our defences have been effected; the permanent structure has been planned and the foundations firmly laid; but the work of building is by no means completed. The first and foremost purpose of this structure lies in our contributions to the various forces organised under N.A.T.O. Secondly it has to maintain our naval and military contributions to the United Nations forces fighting in Korea, and the strengths of all three Services needed to combat the communist forces in Malaya. Additionally numerous bases and garrisons throughout the Commonwealth must be manned. In particular the single-handed task of maintaining peace in the Middle East and the protection of the Suez Canal base is a heavy drain on our resources. In the latter area the political tension eased after the signing of the agreement with Egypt covering the future of the Sudan; but this relaxation was counterbalanced by the deteriorating conditions in Kenya, which at the time of writing has necessitated the despatch of an infantry brigade to that area to combat Mau-mau terrorism. Thirdly our defence structure must provide for the protection of the home country, the most important elements of which are air defence and defence against air-borne invasion. Responsibility for these rests on Fighter and Anti-aircraft Commands, and the Home Guard and Civil Defence organisations.

Whilst progress has been made in the expansion and development of the radar network and warning system, some time must elapse before Fighter Command squadrons are re-equipped with the latest types of aircraft. Little information has been released about the state of our ground anti-aircraft defences, but there is reason to suppose that the position is not unsatisfactory. Considerable progress has been made in planning and training for civil defence and about one half the peace-time strength has now been recruited. In the past year 450 mobile columns have been organised and trained from personnel of static military establishments. These together with the Home Guard will form the backbone of defence against air-borne invasion. Unfortunately efforts to raise the Home Guard have met with singularly little response from the public. Despite the addition to the Regular Army of seven re-formed second battalions, there is not a single active division stationed at home. The state of our home defences cannot, therefore, be regarded with equanimity. To quote the Prime Minister: "Our whole formed or regular organised Army is abroad. This shows how great is the need to improve our fighting strength at home. No other country is voluntarily running the risks to which we have subjected ourselves."



## THE NORTH ATLANTIC TREATY ORGANISATION

At Lisbon in February 1952 the North Atlantic Council set up a target strength for S.H.A.P.E. of 50 divisions and 4,000 operational aircraft by the end of the year. About half the divisions were to be active and the remainder reserve divisions available for employment within 30 days after mobilisation. These targets have been substantially achieved as regards numbers, though the state of readiness of reserve divisions is behind schedule. The forces of Greece and Turkey now provide additional strength for N.A.T.O. Considerable progress has been made in the training and integration of N.A.T.O. forces during the last twelve months. The command structure has been completed. Numerous large scale exercises have been held with the dual objects of training formations and testing the command, staff, and communications machinery. Arms and equipment have been forthcoming in increasing quantities. But one fundamental weakness remained—the failure of all six nations concerned to ratify the treaty to give effect to the European Defence Community. Without the so-called European Army Western Germany remains unarmed, and a dangerous gap exists in the European defence curtain. Some half million men are needed to fill this gap. These cannot be found from the N.A.T.O. partners without weakening the whole structure. Furthermore it is difficult to see how under existing circumstances and terms of national service the reserve formations can attain the state of preparedness laid down at Lisbon.

These two fundamental weaknesses were recognised at the meeting of the North Atlantic Council held in Paris in December 1952, when progress since Lisbon was reviewed and policy for the immediate future formulated. Emphasis was placed on the urgent need to increase the effectiveness of the existing forces rather than to increase their numbers. Quality not quantity was the order of the day. A strongly worded resolution was passed calling for the early establishment of the European Defence Community.

Until such time as Western Germany is rearmed, and the nations of Western Europe are prepared to adopt a policy of two years' conscription, it is difficult to see how N.A.T.O. can become a really effective defence organisation. From all accounts the quality of its military personnel is good, and morale is high. But the machine is unbalanced. On the one hand there is a top-heavy and over-elaborate command structure, backed by innumerable committees, whilst on the other there are insufficient active forces to withstand the first shock of attack. Behind these lies an ill-prepared second line of reserve divisions. On them is bound to fall the main burden of taking the strain until such time as the allied nations are fully mobilised for total war. These comments are nowise intended to belittle the remarkable progress which has been achieved by N.A.T.O. during the last 3 years, but rather to emphasise the enormous difficulties of integrating the efforts of fourteen nations into one united whole in time of peace and in the face of serious economic handicaps.

On May 30, 1952, General Matthew Ridgway succeeded General Eisenhower as Supreme Commander, Allied Powers in Europe. It is as yet too early to assess the debt which the N.A.T.O. countries owe to the new President of the U.S.A. Probably no man living was better

qualified to lay the foundations of European defence, or could have achieved so much in so short a time.

In June Lieutenant-General Enrico Frattini (Italy) replaced General Castiglioni (Italy) as C.-in-C., Allied Land Forces, Southern Europe. A month later Admiral Carney's land forces were divided into two commands, namely A.L.F.S.E. as previously constituted covering Italy and the Western Mediterranean, and Allied Forces South Eastern Europe covering Greece and Turkey. General Willard G. Wyman (U.S.A.) was appointed C.-in-C. of the new command with Headquarters at Smyrna. For the present the air forces of Greece and Turkey are to remain under Major-General Sclatter's (U.S.A.) H.Q. Allied Air Forces, Southern Europe at Florence. The vexed question of allied naval command in the Mediterranean was eventually settled by the North Atlantic Council meeting in Paris in December. They announced the establishment of a C.-in-C. Mediterranean directly subordinate and responsible to the Supreme Allied Commander Europe (SACEUR). Admiral Earl Mountbatten of Burma was appointed to the new command and has recently established his headquarters at Malta. This solution of the Mediterranean command problem must be regarded as a compromise in the interests of national susceptibilities. Admiral Mountbatten's main responsibilities are defined as protection of shipping and convoys throughout the Mediterranean area, submarine and anti-submarine operations, mine warfare, and support of adjacent commands. At the same time the United States 6th Fleet in the Mediterranean is to remain directly under the Command of Admiral Carney, C.-in-C., Allied Forces Southern Europe at Naples. The primary task is defined as support of land campaigns in Southern Europe. This division of responsibilities between separate commands operating in the same area will call for the very closest co-operation between Admirals Carney and Mountbatten and their respective staffs and subordinate commanders.

In Central Europe two major command reorganisations have taken place. In April 1952, General Norstad's Allied Air Forces were subdivided into two Tactical Air Forces; 2nd T.A.F. (Air Marshal Sir Robert Forster R.A.F.) comprising the British, Dutch, and Belgian air formations, and 4th T.A.F. (Major-General Dean S. Strother U.S.A.F.) comprising the U.S., French, and Canadian air formations. In December, H.Q. B.A.O.R. (General Sir Richard Gale) was renamed H.Q. Northern Army Group, in conformity with the C.-in-C.'s responsibility for the Belgian and Dutch forces to be placed under his command in war. At the same time H.Q. Central Army Group (Lieutenant-General Manton S. Eddy) was formed with similar responsibilities for the American and French forces.

#### DEFENCE ESTIMATES 1953-54

In December 1952 the Prime Minister warned the House of Commons and the nation that the continued upward trend of prices would entail some curtailment of the re-armament programme. In general terms he stated that such curtailment would be affected by spreading deliveries of equipment over a longer period. But he added "It will, however, not be possible to solve the problem entirely by spreading deliveries forward into future months or years. This applies particularly to aircraft. We shall somewhat reduce the production of types now in service, but we

shall continue to press forward as rapidly as possible with the introduction of the newer and still more advanced types" (*Hansard Volume 508 No. 23, December 4, 1952*).

The plain facts are that the re-armament programme as originally envisaged has proved too costly, and that a new balance has had to be drawn between the divergent aims of military security and financial solvency. Even so the defence estimates for 1953-54 show an increase of £123 million over the expenditure for 1952-53 (or an increase of £68 million allowing for United States aid). The detailed estimates of net expenditure, as published in the Statement of Defence (see page 420) are :

	£ million
Royal Navy .. .. .	364.50
Army .. .. .	581.00
R.A.F. .. .. .	548.00
Ministry of Supply .. .. .	123.75
Ministry of Defence .. .. .	19.51

making a total of £1,636,760,000, from which must be deducted the figure of £140,000,000 promised in dollars by the United States, giving a net figure of £1,496,760,000.

An explanation of the main headings of expenditure shows that for the Navy about £185,000,000 is required for shipbuilding, repairs, maintenance, and armaments. The corresponding figure last year was £218,000,000. The emphasis in the naval programme of re-armament is to be mainly on frigates, mine-sweepers, carriers, and aircraft. For the Army £164,566,000 is required for warlike stores (as compared with about £156,000,000 for the previous year), and for the R.A.F. £140,000,000 is earmarked for aircraft (as compared with about £111,000,000 for the previous year). The Ministry of Defence estimates include a sum of £13,500,000, being the United Kingdom share in the N.A.T.O. infrastructure programme.

#### MAN-POWER

The strength of the Active (i.e. full-time) forces on April 1, 1952 was 862,700, made up as follows :

	<i>Regular</i>	<i>National Service</i>	<i>Women</i>	<i>Totals</i>
Royal Navy .. .. .	135,500	4,600	5,100	145,200
Army .. .. .	214,800	224,000	7,900	446,700
R.A.F. .. .. .	171,500	89,100	10,200	270,800
Grand Total .. .. .	521,800	317,700	23,200	862,700

In addition the Reserve and Auxiliary Forces comprised some 273,000 men and women. These figures do not, of course, include Class Z and Class G reservists, who would be liable to recall in the first stages of an emergency, and of whom some 341,000 have undergone 15 days' refresher training during the last two years.

The estimated strength of the Active Forces on April 1, 1953 was 879,800 made up as follows :

	<i>Regular</i>	<i>National Service</i>	<i>Women</i>	<i>Total</i>
Royal Navy .. .. .	134,400	6,900	5,200	146,500
Army .. .. .	218,000	227,500	8,900	454,400
R.A.F. .. .. .	189,300	79,200	10,400	278,900
Grand Total .. .. .	541,700	313,600	24,500	879,800

The official strength of the Reserve and Auxiliary Forces, as published for January 1, 1953, was about 427,000 men and women.

From the above figures it will be seen that there has been little change in the total strengths of the Active Forces during the last year. The number of regulars has increased by some 20,000, the bulk of them being in the R.A.F. The bare figures themselves do not give a true picture since the emergency measures taken after the outbreak of war in Korea to recall certain categories of reservists and to retain regulars are still to some extent in force. In the long run it is the figures for recruiting, and extensions and re-engagements, which are of significance. Except for certain specialist categories recruiting for the Royal Navy continues to be satisfactory. In the Army and R.A.F. the new short-term engagements for 3 years with the colours had produced intakes of 43,000 and 57,500 respectively up to the end of 1952, but the long term benefit to the Services will depend on the numbers who decide to extend their colour service beyond the initial 3-year period. Unfortunately the upward trend of re-engagements and extensions, noted in 1951, was not maintained in the Army and R.A.F. in 1952, though in the Navy the position remained on the whole satisfactory.

In the forthcoming year the estimated strengths allowed for the Active Forces on April 1, 1954 are:

		<i>Regular</i>	<i>National Service</i>	<i>Women</i>	<i>Totals</i>
Royal Navy	.. ..	123,500	7,800	5,200	136,500
Army	.. ..	231,000	213,200	10,300	454,500
R.A.F.	.. ..	198,000	66,700	10,700	275,400
Grand Total	.. ..	552,500	287,700	26,200	866,400

No similar detailed estimates are published for the Reserve and Auxiliary Forces, but since national service men will continue to pass into the reserve for  $3\frac{1}{2}$  years part-time service on completion of their 2 years' colour service the numbers will rise steadily during 1953. The figures of these reservists are estimated to level out at between 400,000 and 500,000 by the middle of 1954, at which time the peak will have been reached. Thereafter the intake will be balanced approximately by the outgoing numbers who have completed their  $5\frac{1}{2}$  years' national service liabilities.

It will be noted that the total strength of the Active Forces is estimated to decrease by 13,400 during the coming year. The bulk of this loss is to be borne by the Navy, whose strength will be reduced by some 10,000. The reason is that, whereas it has been found possible to taper the release of men compulsorily retained or recalled from the reserve in the case of the other two Services, the Royal Navy have not been able to follow suit. It has now, however, been decided that all such personnel will be released by the end of March 1954. To mitigate the effects of this appreciable reduction in strength, naval shore staffs are to be reduced to the minimum, and temporary reductions are to be made in the complements of many categories of ships at sea (excluding ships on the Far Eastern Station). It is hoped to restore the cuts in complements of ships at sea within two years.

The hard core of the Reserve and Auxiliary Forces depends on the numbers of volunteers—the men and women who of their own choice devote so much of their spare time in preparing themselves to back up



their regular comrades in war. In the Navy and Air Force Reserves there has been a steady increase in the number of volunteers during the past year. In the Army Emergency Reserve (formerly the Supplementary Reserve) there has been a marked increase of about 50 per cent. In the Territorial Army, however, the strength has declined, mainly due to the loss of those who enrolled when the force was reconstituted after the war. However, an encouraging sign for the future rests in the fact that by the beginning of this year 29 per cent. of national service men who had passed into the Territorial Army had taken on voluntary engagements.

### THE WAR IN MALAYA

The bitter struggle against the Communists in Malaya has now lasted for over 5½ years. Even the most optimistic cannot see the end in view. The most pessimistic must, however, admit a marked improvement in the situation over the last 12 months. Militarily this improvement is reflected in the decrease in casualties amongst the security forces and civilians, and an increase in the numbers of guerrillas killed and who have surrendered. Attacks and sabotage against rubber estates, mines, and communications have steadily declined. Over 400,000 Chinese squatters, from whom the Communists formerly derived sustenance, have been settled in new villages and brought within the ambit of the civil administration. Total casualties inflicted on the terrorists since the beginning of the campaign up to March this year have amounted to about 6,000, including some 3,900 killed, 1,000 captured and 1,000 surrendered. Despite these losses it is estimated that the number of armed communists has not declined and is now about 7,000. Whilst, therefore, the "shooting war" has gone against the enemy, his armed strength remains appreciable. Moreover there are signs that he is increasing his efforts to win the "cold war" through political subversion. The problem of Malaya is primarily political. The crux of that problem is to integrate the two million Chinese inhabitants into the political life of the country, with the agreement and willing co-operation of some two and a half million Malays. A start has been made. It is estimated that between 50 and 60 per cent. of the Chinese population of the Federation of Malaya have now been granted Malayan citizenship. Chinese are now eligible to join the civil service and the police. The newly formed Federation Army is open on equal terms to Malays, Chinese, Indians, and Eurasians. The first battalion and armoured regiment are now being formed, but the number of Chinese recruits presenting themselves for both the Army and the police is disappointing. In the meantime it is still necessary to employ a force of some 23 infantry battalions (British, Gurkha, Malay, East African, and Fijian) plus supporting arms and services, together with a considerable number of squadrons of the R.A.F. and R.A.A.F. Ships and motor launches of the Royal Navy patrol the coasts. In addition some 150,000 regular and auxiliary armed police are constantly employed and the number of Home Guards is approaching 250,000.

On March 17, 1953 General Sir Rob Lockhart relinquished his appointment as Deputy Director of Operations under the High Commissioner General Sir Gerald Templer. His appointment lapsed with his departure. In its place the post of principal military staff officer to the High Commissioner was created. Major-General W. P. Oliver has been appointed

to fill this post. To General Sir Rob Lockhart and his predecessor the late Lieutenant-General Sir Harold Briggs (also an Indian Army officer) Malaya owes a great debt of gratitude. In the 14 months since he was appointed High Commissioner with full operational control over all the security forces General Sir Gerald Templer has acted with remarkable energy and full appreciation of the political problems confronting him. But from all accounts the civil administration still lacks sufficient numbers of experienced officers to carry out the manifold tasks confronting them. This defect cannot be remedied in a matter of months. In the meantime considerable progress has been made in the last year in Malaya. Much remains to be accomplished, and there is no short cut to success.

### BRITISH FORCES IN KOREA

After 18 months' continuous service in the line the Commonwealth Division was withdrawn into reserve in February. During the whole of last year the Korean front was static, but the enemy steadily built up his artillery strength. The division in addition to active night patrolling was engaged in a number of full-scale raids involving all arms with the object of preventing an enemy build-up, taking prisoners, and retaining the initiative. British casualties amounted to 196 killed and 650 missing, wounded, or prisoners of war during this period. The division has successfully beaten off several enemy attacks. These Communist attacks are usually very much of a pattern: starting with a heavy artillery bombardment which may last for one or two days and culminating in about thirty minutes of saturation shelling at dusk under cover of which the infantry advance. Throughout these engagements the division has fought with outstanding success. Typical of these engagement is the attack carried out by Chinese troops on November 19 against "The Hook", a key ridge some 30 miles north of Seoul held by the Black Watch, in which the battalion supported by the 3rd Bn. Princess Patricia's Canadian Light Infantry drove back the enemy with severe casualties after nine hours of hand-to-hand fighting. Enemy killed in this action numbered 130. Five days later companies of the 1st Bn. The Royal Fusiliers and 1st Bn. Royal Australian Regiment carried out a raid on a Chinese position which involved some 6½ hours of fighting within the enemy lines. At the time of writing, apart from the two battalions already mentioned, the following units are serving in the Commonwealth Division: 1st Bn. The King's Regt.; 1st Bn. The Duke of Wellington's Regt.; 1st Bn. The Durham Light Infantry; 1st Royal Tank Regt.; 20th Field Regt., R.A., and 61st Light Regt., R.A.

There has been little change in the pattern of naval operations during the past year. Ships on the Far East Station including aircraft carriers, cruisers, destroyers, and frigates have been constantly engaged in blockade and escort duties off the West Coast in conjunction with units of the Australian, Canadian, Dutch, French, New Zealand, and United States navies. The enemy's mine-laying activities have increased and his coastal batteries have been strengthened. Naval aircraft have operated throughout—in the face of increasing fighter and anti-aircraft opposition—against shore targets and spotting for ships' bombardments. Four days after she arrived in Korean waters the light fleet carrier *Ocean* with two

squadrons of Sea Furies and Fireflies achieved the remarkable record of 123 sorties against enemy-held positions in one day.

A squadron of Sunderland flying boats has been employed continuously on patrol and reconnaissance duties since the Korean war started. In addition a number of R.A.F. pilots are attached to Commonwealth and United States squadrons, and have accounted for a number of MIG aircraft destroyed in combat.

## MINISTRY OF DEFENCE

### *Chief Staff Officer*

On December 1, 1952, Major-General Sir Ian Jacob was succeeded at the Ministry of Defence as Chief Staff Officer by Lieutenant-General Sir Nevil Brownjohn.

## SERVICE PENSIONS

On December 16, 1952, the Government announced that it had been decided to increase the rates of awards of ordinary pensions to the widows and children of officers and warrant officers of the three services. Under the new regulations the means test has been abolished and the dependants of long service ratings and other ranks will for the first time be eligible for pensions. The details of this welcome but long overdue reform, which came into force on December 1, 1952, are given in a White Paper (Cmd. 8741) (see p. 488). In the meantime the anomalous position regarding the rates of retired pay for officers who retired before September 1, 1950, remains. An encouraging sign is the interest being shown by increasing numbers of members of both Houses of Parliament as evinced in recent debates on the subject in both Houses and the replies by Ministers which have given evidence that further pressure may yet break down the Treasury's resistance.

## THE ROYAL NAVY

The main task of the Royal Navy in time of war would be to safeguard our sea communications. The enemy's main weapons would be the submarine, the mine, and air-borne weapons. To combat these the Navy requires aircraft carriers, destroyers, escort vessels of various types, and minesweepers. Over the last 3 years satisfactory progress has been made with the provision of all these various categories of ships. The effectiveness of carriers depends on their aircraft. It is, therefore, disturbing to record that the present state of naval aviation is unsatisfactory. This is in the main due to delays in the production of new types of aircraft. Apart from a small number of Attacker jet fighters the Navy is still mainly equipped with obsolescent piston-engined aircraft. In the meantime, until the lag in production of new types of British aircraft is overcome, the deficiencies are being partly met by American aircraft supplied under the Mutual Defence Assistance Programme.

In the difficult task of striking a balance between our existing resources and the needs of all three Services, the Royal Navy has in the opinion of many competent observers fared badly. A large part of the existing fleet will shortly have to be replaced by new construction, and as a maritime nation we shall have to face the bill, even if it means reduction in the other

two Services. In the meantime the efficiency of the Royal Navy still stands second to none. It is backed by a first class Merchant Marine Service and ship-building industry.

#### FLAG APPOINTMENTS

The following important flag appointments took place during the year on the dates given :

*Third Sea Lord*: Vice-Admiral R. A. B. Edwards (March)

*Portsmouth*: Admiral Sir John H. Edelsten, to be Commander-in-Chief (September)

*The Nore*: Admiral The Honourable Sir Cyril E. Douglas-Pennant to be Commander-in-Chief (November)

*East Indies*: Vice-Admiral W. R. Slayter to be Commander-in-Chief (August)

*South Atlantic*: Vice-Admiral P. B. R. W. William-Powlett to be Commander-in-Chief (September)

*Far East*: Vice-Admiral C. E. Lambe to be Commander-in-Chief (March)

*Flag Officer (Air)*: Vice-Admiral J. A. S. Eccles to be Flag Officer Air (Home) (January)

*Flag Officer (Air)*: Rear-Admiral W. W. Davis to be Flag Officer Air (Mediterranean) (October)

*Fifth Cruiser Squadron*: Rear-Admiral E. G. A. Clifford to be Flag Officer Commanding and Second in Command, Far East Station (September)

*Heavy Squadron*: Rear-Admiral J. Hughes-Hallett to be Flag Officer, Heavy Squadron, Home Fleet

#### PROMOTIONS

In view of his distinguished and outstanding services during the last war, it was announced on May 26, 1952, that Her Majesty had approved as a special case the promotion of Admiral Sir Philip Vian to be Admiral of the Fleet supernumerary to the existing establishment of Admirals of the Fleet.

#### PERSONNEL

Since the outbreak of war in Korea increased naval strength has been attained by retaining on the active list some 1,000 officers due for retirement, and 16,000 ratings who would otherwise have been due to complete their engagements. In addition 600 officers and 8,000 Royal Fleet Reservists had been recalled to active service up to the end of 1952. About 12,000 of these officers and ratings are still serving. These are to be released by March 1954. The Navy will consequently be faced with two considerable man-power problems in the future. The first is the short-term one of filling the gaps left by these personnel. As previously stated this problem is to be met by temporary reduction in certain establishments ashore and afloat. An important element in these economies is to be provided by a scheme for re-disposing the Reserve Fleet in commercial ports, where it will be maintained by civil contract labour instead of serving personnel. In this way it is hoped to release for duty elsewhere some 3,500 officers and ratings. The second problem is the constantly recurring one of balancing the numbers of senior and junior



ratings. The bulk of personnel leaving the Service between now and March 1954 will be senior and experienced ratings. The gap which they will leave cannot be filled except by intensive training efforts and a long-term policy of encouraging new entrants to take on long-term engagements. Efforts have been made to further both these methods. During the last 15 months the petty officer and leading rating content of the Navy has been increased by some 2,500 ratings. It is hoped that the improved conditions of service introduced during the last two years or so will induce sufficient men on seven-year engagements to transfer to continuous service engagements. To date the numbers transferring have been increasing, but as yet they are insufficient to make up the deficiencies. The future position is, therefore, by no means assured.

The position in regard to officers is somewhat more satisfactory due to the numbers of those retained or recalled to the Service during the last two and a half years who have either volunteered to serve further or who have been granted permanent commissions. Furthermore, there has been a considerable increase in the number of permanent officers volunteering for naval aviation; and the scheme for granting 8-year short-service commissions to regular ratings for air crew duties has proved a great success.

Finally, it is pleasing to record that the W.R.N.S. is maintaining its strength and remains as efficient as ever.

#### ROYAL NAVAL RESERVE

Under a new scheme boys joining the shipping industry, provided they are not less than 16½ years old and have completed a specified amount of training in either the Sea Cadet Corps or a sea training school, may at the same time join the R.N.R.

#### ROYAL NAVAL VOLUNTEER RESERVE

As a special measure a limited number of National Service officers in the executive branch of the R.N.V.R. are to be selected for permanent commissions in the executive branch of the Royal Navy. The scheme is designed to meet the deficiencies in certain age groups in the R.N. Under another scheme National Service officers of the engineering and electrical branches of the R.N.V.R. now serving with the Royal Navy may be granted permanent commissions in the R.N. The strength of the R.N.V.R. continues to rise. It rose by over 1,100 during 1952 and the majority of the new entries were volunteers. To facilitate expansion in an emergency four R.N.V.R. Air Divisions were formed in June 1952 at the R.N. Air Stations at Ford, Culham, Stretton, and Donibristle. These divisions are commanded by R.N.V.R. officers with the acting rank of Commander. During the summer two R.N.V.R. Air Squadrons carried out their annual training in Malta. The Women's Royal Naval Volunteer Reserve (W.R.N.V.R.) which was formed at the end of 1951 now numbers over 900 officers and ratings.

#### ROYAL MARINES

In the summer of 1952 the 3rd Commando Brigade moved from Malaya to Malta. The Brigade had served for two years in Malaya where it had served with distinction, mainly in the State of Perak. It accounted for

some 170 guerrillas killed and 50 captured for a loss of 4 officers and 15 other ranks killed. Its personnel were awarded 18 decorations and 25 Mentions in Despatches for their part in the operations. In November H.R.H. The Duke of Edinburgh, presented the Queen's and Regimental Colours to three Commandos of the Brigade.

The appointment of Major-General H. T. Tollemache as Commandant General which was due to take place in May 1952 was cancelled because of ill-health. In his place Lieutenant-General J. C. Westall was appointed. Consequently, Major-General C. R. Hardy was appointed Chief of Staff to the Commandant General and Major-General C. F. Phillips became M.G.R.M. Portsmouth.

### ROYAL NAVAL MINE-WATCHING SERVICE

This service, which was formed at the beginning of 1952, had up to the end of February this year received some 2,800 men and women volunteers into its ranks. The total number required is about 30,000.

### MATERIAL

The Active Fleet comprises 1 Battleship, 2 Fleet Carriers, 3 Light Fleet Carriers, 11 Cruisers, 31 Destroyers, 31 Frigates, 37 Submarines, and about 50 Minesweepers. In reserve or employed on training and other duties are 4 Battleships, 4 Fleet Carriers, 2 Light Fleet Carriers, 15 Cruisers, 76 Destroyers, 130 Frigates, 16 Submarines, and over 100 Minesweepers.

Of the five aircraft carriers under construction, H.M.S. Ark Royal should be completed in 1954; three of the "Hermes" class light fleet carriers are due for completion within 12 to 18 months and the fourth H.M.S. Hermes was launched in February. The latter ship, when completed, will incorporate the new angled flight deck.

Constructional work on the three "Tiger" class cruisers remains suspended. Three more "Daring" class destroyers, H.M.S. Duchess, H.M.S. Defender, and H.M.S. Dainty have been accepted into the service. The remaining three ships of this class are due for completion in 1953-54. The frigate and submarine programmes have been delayed owing to steel shortages. Thirteen frigates are now in hand and several are due to be laid down during the coming year. Out of thirteen destroyers due for conversion to anti-submarine frigates, four have been completed. A large proportion of the new construction programme is devoted to minesweepers. The first new coastal minesweeper was completed during the year; 47 are included in the construction programme for 1953-54, of which 17 are due to be launched during that period. Aluminium will feature largely in the construction of these vessels and their outer bottoms are wood planked. In addition 48 smaller inshore minesweepers, designed to operate in shallow waters such as rivers and estuaries, are included in the 1953-54 construction programme.

Modernisation of the fleet carrier Victorious and the light fleet carrier Warrior continues and work has started on the modernisation of the cruiser Royalist. No details of submarine construction have been published, but a number of existing craft have been modernised and others are in hand.

Further progress has been made with the development of improved propulsion machinery both of the high-efficiency diesel and the gas-turbine types. The latter is particularly suitable for fast coastal craft and two prototypes are shortly to be installed in a vessel for trial. Other new developments include the application of prefabrication methods to frigate construction and a new type of submarine marker buoy. Finally a new type of anti-submarine equipment has been developed and fitted in H.M.S. Rocket. Briefly this equipment comprises two three-barellled mortars which are electrically linked to an Asdic set and can thereby be automatically trained and fired.

#### NAVAL AVIATION

Four important types of aircraft for the Royal Navy are now on order from British manufacturers. The Fairey "Gannet"—one of the aircraft granted "super-priority"—is for anti-submarine duties. It is powered by the double Mamba turbo-prop engine, carries a crew of three, and is fitted with elaborate electronic search equipment and anti-submarine weapons. Delivery is not likely to start until towards the end of the year. In the meantime a number of "Avengers" have been obtained from America under M.S.A. A second turbo-prop machine, the Westland "Wyvern", is now starting to come into service. It is a single-seater strike aircraft armed with four 20 mm. cannon and capable of carrying bombs, rockets, mines, or a torpedo. Being a turbo-prop machine it is suitable for operation at lower altitudes than jet-engined aircraft. Another new-comer is the jet-engined Hawker "Sea Hawk". No. 806 Squadron is now being equipped with these aircraft, which are destined in due course to replace both the jet-engined "Attacker" and the piston-engined "Sea Fury" as a day fighter. The fourth type is the Vickers "Sea Venom" all-weather fighter, production of which has been delayed. The Admiralty have also announced that orders have been placed for a twin-jet swept-wing fighter. This will be an improved version of the Vickers-Armstrong Supermarine 508, which was first seen at the S.B.A.C. display, Farnborough in 1951. In addition to a number of British built helicopters now in the Service, No. 848 Squadron was recently equipped with American built Sikorsky A.55's and shipped to Malaya to assist in jungle operations.

#### THE ARMY

The strength of the Regular Army is now equivalent to 11½ divisions. Even so it is barely sufficient to meet the various commitments overseas, which absorb 80 per cent. of the fighting units. Consequently there is little left to form a strategic reserve and for home defence. The four divisions stationed in Germany contain about 50 per cent. regular personnel. The remainder are two-year national service men. The divisions are fully equipped and their standard of training is probably as high as can be attained in peace time and under present conditions. In Korea our share in the British Commonwealth Division takes 10,000 men. These and the bulk of the units in which they serve are relieved regularly, so that they leave the whole Army with their experience gained in actual fighting. In Malaya, Singapore, and Hong Kong the equivalent of not less than two divisions are employed on active service or conditions

approaching active service. Two divisions and a parachute brigade have been stationed in Egypt during the past critical year. An infantry brigade has recently been sent to reinforce the colonial troops in Kenya. In addition the garrisons of Cyprus, Malta, Libya, the Sudan, and other overseas bases have demanded their quota of regular troops. The withdrawal of two battalions from Eritrea represents the only lightening of the burden which the Army has been called upon to bear.

Such is a brief outline of the distribution of forces. Seldom in peace have so many units been engaged in war, if one may be permitted the paradox; never before in peace has such a high proportion of the Army been stationed overseas; and in the words of the Secretary of State for War "we have every reason to think that at the present time we have got the best equipped, best-trained, and best prepared Army we have ever had in peace".

Unfortunately there is a darker side to this bright picture. Although there has been some improvement in recent months, the intake of regular officers is still unsatisfactory, and despite the improvement in recruiting the Army is short of manpower. Nor is the position likely to improve. Many units are now under strength and it is estimated that, owing to the release of men compulsorily retained with the colours and the smaller numbers available for call-up under national service in the future, by 1955 the Army will be short of some 15,000 men. Moreover there is most likely to be a shortage of long service men, from whom the bulk of warrant officers and senior N.C.O.'s must be found.

The bulk of regular officers enter the Service through the Royal Military Academy, Sandhurst. A recent analysis of cadets passing through the R.M.A. since it re-opened in 1947 shows that the bulk of the intake is being drawn from the South of England. Thus the full national potential of officer material is not being tapped. Moreover, of those who enter Sandhurst some 60 per cent. are graded on arrival as "likely to make a below-average officer." The shortage of officers all told is not less than 3,000 and is most marked in the technical arms. The reasons for this state of affairs are debatable and it is not proposed to discuss them here.

In an attempt to improve the position as regards the technical arms the War Office have introduced two measures. Young men who have passed the Intermediate Science Examination of London University, or its equivalent, may now be granted regular commissions after graduating at the Military College of Science. A boarding school at Welbeck Abbey is to be opened for boys between  $15\frac{1}{2}$  and  $16\frac{1}{2}$  years, from which after two years they will pass on to the R.M.A. Both these schemes are due to start in September. A further measure, applicable to all arms, has also recently been introduced, whereby selected short service officers may be granted extended service commissions, with eligibility for a pension after 20 years' service.

Regarding the prospective shortage of long service other ranks, the position is obscure. At the present only 10 per cent. of Regulars have over six years' service. During 1952, 43,100 men and boys enlisted from civil life as compared with 18,800 in 1951. Of these close on 40 per cent. enlisted for the recently introduced 22 years engagement. But as yet there is no means of telling whether these latter will fulfill their engagements or opt to leave the Service, which they are free to do after 3 years.



A serious factor lies in the high percentage of overseas service which men are bound to face combined with the shortage of married quarters in the bulk of overseas stations. For this there is no short-term remedy, and it remains to be seen whether the recently introduced special rates of local overseas allowances for married men will compensate for enforced separation from their families, which is undoubtedly one of the greatest deterrents to a service career today. In the women's services, apart from a shortage of nursing officers, recruiting has improved in both the Q.A.R.A.N.C. and the W.R.A.C.

Formation and unit training throughout B.A.O.R. was carried out on an intensive scale during the spring, summer, and autumn of 1952. As a result valuable experience was gained in the exercise of command and staff duties and in the welding of formations and units into an efficient fighting machine. At the same time certain weaknesses in individual training were disclosed, which probably arose from the emphasis placed on higher training. Accordingly the winter was devoted to individual training with the object of redressing the balance. As far as circumstances permitted collective training has been carried out by the 1st and 3rd Divisions and 16th Independent Parachute Brigade in the Canal Zone and in Jordan. At home owing to the lack of regular troops no large-scale manœuvres were held in 1952. The training of Territorial units brought up to strength with "Z" reservists was, however, carried out up to brigade level, and commanders and staffs of the higher formations up to Corps level were exercised. Units of the 16th Airborne Division (T.A.) flew to Germany and dropped in exercises with B.A.O.R.

The production of new equipment has now reached a stage where money and not productive capacity is the limiting factor. The Centurion tank is available in adequate numbers for the regular armoured divisions, and next year it is proposed to start issue to the Territorial Army. In addition large orders have been placed by the U.S.A. under "off-shore procurement" for N.A.T.O. forces. Amongst new weapons now under production for issue to infantry are a lighter and recoil-less anti-tank gun, the American 3.5-inch rocket launcher and a new anti-tank grenade dischargable from the service rifle. No final decision has yet been reached regarding the new .280 rifle vis-à-vis the new American .300 rifle. In the meantime, as a result of combined British, Canadian, and Belgian efforts, a new small-arm cartridge plus bullet has been designed, which is due to go for trials this year, and which it is hoped will be acceptable to all N.A.T.O. countries. The next step is to produce the best rifle to fire the cartridge. To quote the Under-Secretary of State for War "the calibre (of this cartridge) will not be greater than .300 and will probably be .280; and a fairly simple adaptation of the breech of the rifle or the automatic gun will make it possible for the Americans to join in" (Hansard Volume 512, No. 70, 10 March, 1953). The exact meaning of this statement to the House of Commons was obscure. It has not since been clarified. It would, however, appear to indicate that, if the trials are successful, it is hoped to reach agreement with the U.S.A. and other N.A.T.O. countries on a light-weight self-loading rifle with rimless cartridge case and of a calibre somewhere between .280 and .300.

Looking over the progress made during the past year one may conclude that the Regular Army has made rapid strides in training at all levels and

in its re-equipment. It is a first-class Army. Behind it stands a large Reserve of trained and semi-trained manpower comprising volunteers and National Service men. With the limited time available for annual training and with the best will in the world, reserve formations and units could not be got ready to take their place in the field in under six months—probably longer. In the event of war this would be too late. In facing this problem we are not alone. It confronts all the N.A.T.O. countries alike. Until a solution is found, our security is nebulous.

#### SENIOR APPOINTMENTS

The following appointments to the more important commands and staff posts took place during the year :

*Chief of the Imperial General Staff:* General Sir John Harding (November)

*Quarter-master General:* General Sir Ouvry L. Roberts (August)

*Vice Chief of the Imperial General Staff:* Lieutenant-General H. Redman (October)

*Deputy Chief of the Imperial General Staff:* Lieutenant-General A. D. Ward (January)

*Commander-in-Chief B.A.O.R.:* Lieutenant-General Sir Richard N. Gale (September)

*General Officer Commanding-in-Chief, Eastern Command:* Lieutenant-General Sir George Erskine (May)

*General Officer Commanding-in-Chief, Southern Command:* Lieutenant-General E. E. Down (August)

*Commander 1st Corps, Germany:* Lieutenant-General Sir James H. Cassels (December)

*General Officer Commanding, British Troops in Egypt:* Lieutenant-General Sir Francis W. Festing (May)

*General Officer Commanding-in-Chief, British Troops Austria:* Major-General R. E. Urquhart (July)

*General Officer Commanding, Malaya:* Major-General Sir Hugh Stockwell (June)

*Commander, Commonwealth Division, Korea:* Major-General M. M. Alston-Roberts-West (September)

*Commander 1st Division:* Major-General T. Brodie (July)

*Commander 3rd Division:* Major-General J. H. N. Poett (May)

*Commander 17th Gurkha Division and Major-General Brigade of Gurkhas:* Major-General L. E. C. M. Perowne (September)

#### THE WOMEN'S SERVICES

Officers of the W.R.A.C. are now to be admitted to the permanent establishments of the Royal Engineers, Royal Signals, R.A.S.C., R.A.O.C., R.E.M.E., R.A.P.C., and R.A.E.C. They will be eligible for promotion up to the rank of Lieutenant-Colonel in these appointments. For the time being the number of vacancies will be restricted to rather less than 100. At the same time the number of technical trades open to other

ranks has been extended to include electrician, vehicle mechanic, armourer, surveyor, and telecommunications mechanic. Short service commissions in the W.R.A.C. have also been introduced for women suitably qualified for staff and corps appointments. In a further move to expand the Corps an experiment has been started in Scottish Command, whereby women will be enlisted for employment on a purely local basis. They will live in their own homes and will not be liable for posting elsewhere.

#### THE HOME GUARD

Enrolment into the Home Guard started in April 1952. It was aimed to form 163 battalions east of the line Flamborough Head-Selsey Bill, and 418 battalions west of that line. The former were to be on a peace establishment of 900, and the latter on a cadre establishment of 50. The response was poor and by November the number enrolled in units was only about 22,000 with a further 19,000 on the emergency list. It was, therefore, decided to reduce the strength of the effective battalions from 900 to 300, and to increase that of the cadre battalions from 50 to 100. Whilst this measure reduced the total peace time establishment from about 170,000 to about 91,000, it was hoped to encourage men to register on the Reserve (i.e. Emergency) Roll, who would be immediately available to join units in an emergency. At the same time it would enable the cadre battalions to form a more solid foundation for their build-up in the event of war. Men in units are entitled to uniform and greatcoats and a start has been made with training.

#### THE ROYAL AIR FORCE

The strength of the Active Air Force continued to rise during the past year. On April 1, 1952, it amounted to 270,800 men and women. The estimated strength on April 1, 1953, was 278,900. The National Service component decreased by about 10,000, but the number of regulars increased by about 18,000. Unfortunately the bulk of regulars recruited in recent months are on short-term engagements, and their contribution to the Service in the long run will depend on the numbers who later decide to extend their colour service. Under the modified defence programme further expansion in personnel is not contemplated and the estimates for 1953-54 cater for a reduction of some 3,500 during the coming year. This does not imply a reduction in first-line fighting strength, which will be increased through the re-equipment of squadrons with new aircraft, but reflects a tailing off in the training organisation needed to build up new squadrons. In contrast to the W.R.A.C. recruiting for the W.R.A.F. has shown no improvement. The reasons for this are not apparent, though possibly the attractive No. 1 dress introduced for the former corps may be one of them.

As in the previous year the main expansion in operational strength has taken place in 2nd Tactical Air Force and Fighter Command. In the former the Venom fighter-bomber has started to replace the Vampire, and an effective night-fighter force has been built up with Meteor NF.11's. Pending the production of Swifts and Hunters, day-fighter squadrons are now being equipped with joint Canadian and American-built F-86E Sabre-jets. Sabres are also due for delivery to Fighter Command, the

main armament of which is still based on Vampires and Meteors. The Canberra bomber is now well established in Bomber Command and further expansion in squadrons is proceeding now that production has got into its stride. This aircraft, suitably modified, is also being issued to photographic-reconnaissance squadrons. The main equipments of Coastal Command remain the Shackleton and the Lockheed Neptune. A new version of the former, the Shackleton Mark II, with increased carrying capacity, is now coming into service.

Hastings and Valetta squadrons of Transport Command have been engaged in a number of tasks during the year including the passage home of casualties from the Far East, the transport of troops to Kenya, and the carriage of materials in connection with the recent flood disasters on the East Coast. In Malaya, Brigand, Hornet, Sunderland, and Vampire squadrons have been continuously engaged in support of the troops operating in the jungle; Valetta squadrons have been similarly employed on supply dropping and the helicopter flight has brought out considerable numbers of casualties from the jungle.

The flying training organisation continued to expand throughout the year. The number of fully-trained aircrews turned out rose to some 2,900, which was nearly double the number for the previous year. Considerable numbers of pilots and navigators have been trained in Canada, and about 100 pilots are training in U.S.A. under a scheme started last May under N.A.T.O. arrangements. Close on 5,000 Class "G" Reservists were called up for a period of 15 days refresher training with the Control and Reporting Organisation during the summer of 1952. To direct training activities in Fighter Command, a new Group—No. 81—was formed to take over the responsibilities for fighter Operational Conversion Units, the training of staff for the Control and Reporting system and for certain other training activities which formerly fell to operational fighter groups.

The Royal Air Force has now reached the stage where the foundations of the new structure have been firmly laid. The training organisation has been built up, new airfields opened, and regular recruiting expanded. In common with the other two Services man-power difficulties are being experienced in building up a hard core of long service men and highly skilled tradesmen. How far these can be overcome remains to be seen. It depends largely on the numbers who decide to re-engage during the next few years. The British aircraft industry is second to none, and the R.A.F. can look forward to a steadily increasing flow of the finest types of aircraft during the next 2-3 years as production gets into its stride. We should then have an Air Force of the highest quality and efficiency.

#### EQUIPMENT

Three types of fighters are now under "super-priority" production for the R.A.F.—the Hawker Hunter, the Vickers Supermarine Swift, and the Gloster Javelin. The Hunter and the Swift are both single-seat swept-wing day-fighters powered with one Rolls-Royce "Avon" jet engine. In addition to a large number of Hunters on order for the R.A.F., 450 have recently been ordered by U.S.A. under "off-shore" contract for N.A.T.O. A further 200 under a similar contract will be constructed in Belgium and Holland. The Swift is in a more advanced state of production than the

**Hunter.** It is likely to appear in service before the end of the year. The Gloster Javelin (formerly referred to as the G.A.5) is a two-seat all-weather and night fighter powered with two Armstrong-Siddeley "Sapphire" jet engines. This aircraft, which is of delta-wing design, is reported to have an exceptionally long range for a fighter combined with adequate storage space for the armaments and electronic equipment required for high-altitude interception. In addition to the 4-jet engined Vickers Valiant, two further types of medium long-range bombers have now been ordered. These are the Vulcan and the Victor. The Vulcan, which under its former title of Avro 698 made a sensational appearance at the S.B.A.C. display at Farnborough last year, is of delta-shape and powered with four "Avons". No details of its performance have been released. It is expected to reach the service in 1954. The Handley-Page Victor, of which the prototype made its maiden flight last December, represents the latest variant of the swept-back wing design. The wings in this case instead of being swept back are curved back so that their outline is scimitar-shaped. The aircraft is powered by four "Sapphires" and is reputed to have a speed in excess of 600 m.p.h. A further type of aircraft due to come into the service is the Blackburn Universal Freighter. Twenty of these are now on order for Transport Command. They are a tail-loading aircraft equipped with four Bristol "Hercules" piston engines. They have been named the "Beverley". Reference has already been made to the delivery of F-86E Sabres to the R.A.F. in Germany. Some 300-400 of these should be in service with 2nd T.A.F. by the end of 1953.

### TRAINING

Apart from the several large-scale exercises in which 2nd T.A.F. were engaged under S.H.A.P.E. the most important exercise staged by the R.A.F. was Exercise "Ardent". This took place during October 1952 and was the largest air defence exercise ever held over Britain. The defences were commanded by Air Marshal Sir Basily Embry, A.O.C.-in-C., Fighter Command. Simulated attacks on the United Kingdom were carried out by Bomber, Transport, and Flying training Commands, R.N. squadrons, and U.S.A.F. formations of Allied Air Forces Central Europe. During the exercise over 6,000 sorties were flown by attacking and defending aircraft. The exercise was regarded as the most successful held since the war, and the use of new equipment by both sides made it possible to test all aspects of the air defence organisation. In summing up "Ardent" Air Chief Marshal Sir Ralph Cochrane emphasised that not only had a satisfactory number of interceptions been made, but it had been found possible to tackle the bombers farther from their targets—often some distance from the coast. Furthermore, the use of Canberra jet-bombers had, for the first time, permitted new operational methods and tactics to be employed. On December 5, 1952, four Canberras of No. 12 Squadron completed a 24,000-mile good-will and training tour of the Caribbean, Central and South America. The flight, which occupied 7 weeks, was under the command of Air Vice-Marshal D. A. Boyle and marked the first crossing of the South Atlantic by jet aircraft. Three months previously a single Canberra had completed a double crossing of the North Atlantic between Northern Ireland and Newfoundland in just under



eight hours, setting up an Atlantic speed record of 606 miles per hour on the return flight. This is only one amongst several long distance speed records set up by the Canberra in recent months.

### THE RESERVE FORCES

It is now becoming an established practice for some squadrons of the Royal Auxiliary Air Force to carry out their annual training outside the United Kingdom. Last year fourteen of these squadrons attended practice camps in Germany and Malta. The squadrons flew their own jet aircraft out and back whilst the ground crews were moved in transport aircraft. There is still a shortage of ground crews for these squadrons and in an attempt to fill the gaps, officers and men are now permitted to serve up to the age of 60 years. This rule also applies to the Royal Air Force Volunteer Reserve. Volunteers may now be accepted up to the age of 50, or 55 if they have had previous service. Unfortunately, as a measure of economy and in conformity with the spreading-out of the defence programme, it has recently been decided to reduce the number of civilian-operated Reserve Flying Training Schools from 21 to 7 and the Ground Reserve Training Centres from 22 to 5. This will considerably curtail the aircrew training of the R.A.F.V.R. and cuts out the spare time training of the ground branches of R.A.F.V.R. The latter will now have to rely on their annual training periods, which in future will be carried out at R.A.F. stations. The first pilot in the recently formed flying branch of the Women's Royal Auxiliary Air Force Reserve to be awarded R.A.F. wings was P/O J. L. Bird. She was presented with them by A.O.C.-in-C. Home Command at a parade on September 20. P/O J. L. Bird has about 3,000 flying hours to her credit in over 90 types of aircraft. She includes amongst her other qualifications a senior commercial pilot's licence, instructor's licence, and a Silver C gliding certificate. The strength of the W.R.Aux.A.F. and W.R.A.F.V.R. are now about 2,600 and 700 respectively.

### APPOINTMENTS

The following important appointments took place during the year on the dates given:

*Chief of the Air Staff:* Air Chief-Marshal Sir William F. Dickson (January)

\* *Vice Chief of the Air Staff:* Air Chief-Marshal Sir John W. Baker (November)

\* *Deputy Chief of the Air Staff:* Air Marshal Sir Ronald Ivelaw-Chapman (November)

*Air Member for Supply and Organisation:* Air Marshal Sir John Whitworth Jones (September)

*Air Member for Personnel:* Air Marshal Sir Francis J. Fogarty (November)

*Inspector General:* Air Marshal S. C. Strafford (October)

*Home Command:* Air Marshal H. T. Lydford to be Air Officer Commanding-in-Chief (October)

\* To conform with the corresponding titles and duties in the Admiralty and War Office the titles of V.C.A.S. and D.C.A.S. were transposed on November 1, 1952. A.C.M. Sir John Baker was formerly D.C.A.S.

*Flying Training Command:* Air Marshal L. F. Pendred to be Air Officer Commanding-in-Chief (September)

*Maintenance Command:* Air Vice-Marshal L. G. Harvey to be Air Officer Commanding-in-Chief (December)

*Far East Air Force:* Air Marshal A. C. Sanderson to be Air Officer Commanding-in-Chief (May)

*Malta:* Air Vice-Marshal B. V. Reynolds to be Air Officer Commanding (August)

*Iraq:* Air Vice-Marshal J. G. Hawtrey to be Air Officer Commanding (August)

*Royal Air Force Regiment:* Air Vice-Marshal Sir Francis J. W. Mellersh to be Commandant-General and Inspector of Ground Combat Training (October)

#### PRESENTATION OF THE QUEEN'S COLOUR

On July 25, 1952, Her Majesty presented a Queen's Colour to No. 1 School of Training at Halton. On March 17, 1953, the Queen presented a further colour to the Royal Air Force Regiment in a ceremony at Buckingham Palace. This makes the fourth Royal Colour awarded to the Royal Air Force.

D. A. L. WADE

## CHAPTER III

### COMMONWEALTH STRATEGY

BY LIEUTENANT-GENERAL H. G. MARTIN

(*Military Correspondent, "The Daily Telegraph"*)

THE BRITISH Commonwealth of Nations, which comprises the United Kingdom with its dependencies and the other sovereign partners in the Commonwealth, occupies 26% of the land surface of the globe. Yet it is a maritime community dispersed round the oceans of the world, and the sea is its natural medium of communication.

In the British Kingdom itself, whose area is less than 7% of the total area of the Commonwealth, there is concentrated over 70% of the Commonwealth's white and technically skilled manpower, together with an overwhelming preponderance of its industrial resources. Thus the United Kingdom is still the powerhouse of the Commonwealth. Lying as it does close off the north-west coast of the European Continent, however, it is a powerhouse extremely vulnerable to attack from the mainland to the south and east. It follows that, while the Commonwealth's interests are world-wide, the United Kingdom has also a peculiar interest in the affairs of Europe. It is these divergent pulls that sometimes create stresses in British policy—as for instance over membership of the E.D.C.

Such, in broadest terms, are the characteristics of the Commonwealth which pose its defence problems. These we can consider conveniently under four heads:

1. Home defence;
2. The maintenance of overseas communications;
3. The defence of Commonwealth interests outside Europe; and
4. The fulfilment of NATO obligations.

### HOME DEFENCE

The Home defence of the United Kingdom has two main aspects: air defence, in which I include defence against airborne landings, and internal security. The possibility of maritime invasion is too remote to merit discussion here.

Obviously, the risks that we should run from air attack in another war have increased beyond all bounds. The Russian bomber force is large—amounting perhaps to 6,000 bombers. True, its workhorse, the TU4, is an adaptation of the American B-29 Superfortress, and as such is obsolescent in this jet age; yet the TU4 could penetrate any anti-aircraft defences in existence today either in the United Kingdom or the United States. Even now, therefore, the Russians are certainly in a position to push home their attack; and undoubtedly before long they will replace the TU4 by a 4-engined jet bomber of much higher performance.

As to the form that this attack would take: the Russians are reckoned to be perhaps four years behind the Americans in the atomic race, and to possess less than one-tenth of the United States' atomic arsenal. None the less we must assume that the Russians, in a year or two's time and

with the expert aid of the German technologists whom they grabbed in 1945, will be able to "shoot the whole works". In other words, they might use any or all of the following weapons of mass destruction against us; hotted up atomic bombs which would produce, say, 80,000 tons of TNT explosive force as compared with the 20,000 tons of the A-bomb that wrecked Hiroshima (and as compared also with the one-ton flying bomb that wrecked my house and perhaps yours as well in 1944); hydrogen bombs that would produce one megaton (1,000,000 tons) of TNT explosive effect, and which, according to the American atomic physicist, Dr. R. E. Lapp, would cause "heavy devastation to sixty square miles of area, and moderate damage to 110 square miles"; poison bombs capable of infecting vast areas with radio-activity (alpha, beta, and gamma rays) and of thus rendering these areas unusable; biological weapons designed to infect mankind, animals, or crops on a wholesale scale; and the so-called "nerve" gases whose toxic properties are fantastic. Obviously, where the penalties of failure may be so great, it would be criminal folly to leave our air defences unprepared.

Our active defences are in a transition stage: we are moving towards the era of guided missiles, fully automatic radar-controlled anti-aircraft guns, and jet interceptor supersonic fighters. When we have got all these, then we may afford to breathe a sigh of qualified relief. Before we reach that stage, however, we shall have to harden our hearts and spend a lot of money.

What kind of money is involved we may learn from an American example. In summer 1952 there assembled at the Massachusetts Institute of Technology a team of leading American atomic physicists who prepared for the President a survey of the air defences of the United States. According to reports which the White House has not denied, these physicists told him that existing air defences would not stop more than one in ten of the Russian bombers; that the United States was thus wide open to devastating attack; and that to perfect its defences would cost £4,300m. to £5,700m. Though our defence problem is much smaller it is far more urgent.

The defence of our ports is one of the most urgent aspects of this problem. An atomic bomb burst in such a way as to deluge the docks with radio-active water would put a port such as, say, Liverpool out of action indefinitely. Suppose that such a bomb had been burst in Antwerp docks in December 1944 at the moment of Rundstedt's counter-offensive: what would have been the effect on the subsequent campaign in North-West Europe?

Moreover, in the event of war, our problems would not be confined to denying to our enemy the skies over the United Kingdom. Unless we could deny to him also Western Europe—deny to him, that is, the base from which he would launch his rockets and robot aircraft—our air defence of Great Britain itself would be futile. Here, fortunately, our air defence needs and our obligations to NATO coincide. Formerly our frontier was in the Low Countries; latterly it has been on the Rhine; today it is on the Elbe.

Active air defence is by no means the whole story, however; there is also passive defence—the Civil Defence Corps, that is, and the Auxiliary Fire Service and Hospital Service Reserve. These vitally important

Civil Defence Services are on a voluntary basis and remain in consequence notoriously undermanned.

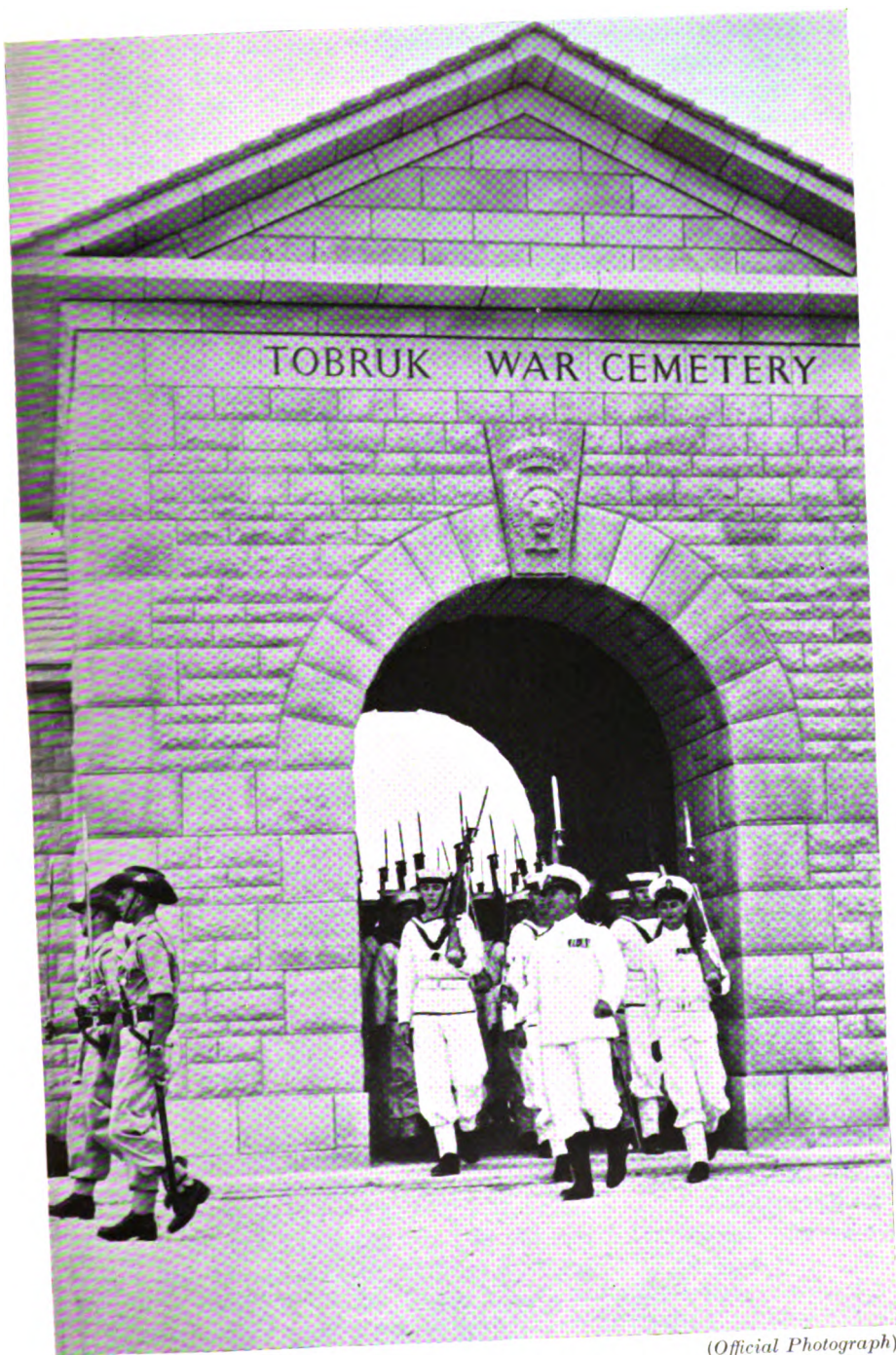
Recently, when on a visit to so-called "neutral" Sweden, I saw what can be done in the civil defence field. There every man between the ages of 16 and 65 is liable to some form of service. The great majority do their military training at 20 and thereafter remain in the reserve, liable to recall, until they are 47; but from 16 to 20 and from 47 to 65 these Servicemen must complete their time either in civil defence or in the Home Guard. The rest—those, that is, in key industries or of low medical category—are indeed excused military service but are liable instead to service in Civil Defence or the Home Guard for the whole span from 16 to 65. Such are the sacrifices required by a Socialist Government of the least militarily minded people in Europe. Swedish policy, I was assured on the best authority, is one not of neutrality but of independence. The Swedes certainly spare no pains to sustain that policy. In respect of obligatory service in Civil Defence and the Home Guard we should do well to copy them.

So we come to our own Home Guard. Against great opposition Sir Winston Churchill's Government has reconstituted it on a voluntary basis, and at least the framework exists. That we need a Home Guard in being, ready instantly to take up its duties in emergency, ought surely to be plain to all. Nearly the whole of the Regular Army is already overseas. True, the Territorial Army would be there at the start, but it would be working against the clock to fit itself to join the Regular Army overseas. It could not afford the time to range at large over the countryside. Who then would frustrate the carefully prearranged plans of sabotage that the Communists would certainly launch?—or deal with minor airborne landings at airfields or elsewhere? The answer is: none but the Home Guard. The only pity is that it is not stronger and more ready.

As for the Territorial Army, it is far more efficient than it has ever been before in peacetime. The intensity of its training has already reached such a pitch, however, that many old-time volunteers are finding the pace too hot. Yet, with the object of fitting it to take the field within the first month of war, some would like to make the pace still hotter; thus there is talk of lengthening the 15-day annual camp periodically to 30 days. To do so, in my opinion, would not serve the purpose intended: instead, it would wreck the Territorial Army as an, in part, voluntary force. Part-time citizen soldiers cannot be asked to give more than they are giving at present.

There is no doubt that there should be in addition a central reserve of several divisions of the Regular Army stationed in the United Kingdom, where there is now not one Regular Division left. Such a reserve is desirable in peacetime for two reasons. It would be available in emergency to reinforce any threatened front in Europe or elsewhere; and meanwhile its presence in the United Kingdom would ensure that officers and men could spend a reasonable portion of their lives at home stations and with their families. This human factor is all-important and must be given consideration in all our strategic planning. At present, with 80% of our fighting units overseas and 66% of married men separated from their families, morale has suffered sadly. The Army needs a break.





*(Official Photograph)*

Memorial Service at Tobruk. Royal Australian Forces who took part



In 1868 a great Secretary of State for War, Mr. Edward Cardwell, afterwards Lord Cardwell, initiated the linked battalion system that endured till 1939. Under this system one half of the Army was normally serving at home, where it not only trained recruits for the other half overseas but was available to provide the expeditionary forces in two great wars. It was this system that made possible a regular *roulement* between home and foreign stations and so ensured a contented army: its restoration, or the introduction of something like it, is the goal at which to aim.

To sum up then, our home defence requirements are these: modernised air defences; obligatory service for all, either in the Civil Defence Services or the Home Guard; and a recreated central reserve of several Regular divisions in the United Kingdom.

Even with all these safeguards, however, we should still have too many eggs in our island basket. In this atomic age 50m. people clustered round a bull's-eye at almost point-blank range offer far too tempting a target; it would be better for the Commonwealth as a whole if many of these 50m. were to take their skills to the remoter safety and wider horizons of Canada and Australia, there to reinforce the original communities of British stock. It should be the policy of all the Governments concerned to further this transfer of population by every possible means.

### MAINTENANCE OF COMMUNICATIONS

So we come to the maintenance of our sea communications. The Commonwealth, I repeat, is a maritime community; and it is the traditional task of the Royal Navy, latterly with the help of R.A.F. Coastal Command, to provide cover for our shipping at sea—cover against submarine, surface, or air attack and defence against mines. In a future war this would be no light task; for Russia, we are told, now has the world's third largest navy. In the Atlantic and Mediterranean the task would be now the joint responsibility of the NATO Navies. These would be at grips with two new and formidable foes—the schnorkel submarine and the pressure mine. Against these two banes it is for the scientist to discover antidotes—and for the Navies to apply them.

On the other hand it is the responsibility of the land and air forces to hold such bases overseas as the Navy may need to enable it to function, and also to keep open those defiles or narrow waters through which our shipping must pass. Thus the land and air forces find themselves holding Gibraltar, Malta, the Suez Canal Zone, and Aden to keep open the long defile that links the Atlantic and Indian Oceans by way of the Mediterranean and Red Sea. They find themselves, too, holding Singapore, greatest entrepôt in South-east Asia and sentinel at the gateway between the Indian Ocean and the South China Sea; and Hong Kong, greatest surviving entrepôt on the China Coast, sounding-board on the Communist mainland, and naval outpost at the entrance to the East China Sea. These, together with Karachi, Colombo, Madras, and Calcutta in the territories of our three fellow members of the Commonwealth, Pakistan, Ceylon, and India, are the bases or boosting stations on that vital artery, the Mediterranean route to East Africa, South and South-east Asia, Australasia, and the Far East. It is a route of the greatest value

to us in war, but indispensable to us in peace when 30m. tons of British shipping passes annually through the Suez Canal.

No less necessary in case the Mediterranean route should again be closed to us, and hardly less convenient as a link with Australasia and the Far East, is the alternative or Cape route. Here the boosting stations are Dakar in the hands of our French Allies, our own West African ports, and the galaxy of great ports in the Union of South Africa—Cape Town and the naval base at Simonstown, Port Elizabeth, East London, and Durban.

Such then are the sea communications that link Britain with her dependencies and her fellow members of the Commonwealth who lie on the periphery of the vast heartland of Eurasia, now the seat of Communism. Scarcely less important are the Commonwealth air routes that serve the same purpose. All-important on these air routes is the Middle East complex of junctions and staging-posts: Cairo and Khartum, Amman and Basra, Bahrein and Karachi. It is worth noting that all these lie in the territories of Islamic States who have a certain community of outlook, especially in moments of politico-religious emotion. In this connection the possible repercussion of future events in the Suez Canal Zone will be discussed later.

In parenthesis, however, this much may be said here. Commonwealth defence is a serious business; our freedom and lives depend on our making a go of it. Surely then it is a pity that the policy of successive British Governments towards Spain has been such as to goad the Spaniards to renewed demands for the surrender of Gibraltar? and that Christian Spain, a potential ally of inestimable worth, should still be an outcast from the anti-Communist camp. We have no call to be more self-righteous or more prejudiced over the Spanish issue than are the Americans. A sport, too, that we might well discontinue is the baiting of Dr. Malan, a Commonwealth Premier who was recently a most courteous host to our Royal Family, and who is another willing ally on the anti-Communist front. It is indiscreet to goad the South African Nationalists; we might need their help so very badly in time of war.

So much for our communications: other aspects of their defence will emerge as we discuss the defence of Commonwealth interests overseas.

#### THE DEFENCE OF COMMONWEALTH INTERESTS OUTSIDE EUROPE

The pattern of Cominform strategy which we have to counter is plain enough. To the Cominform the supreme enemy is the United States. Before it tries conclusions with the United States, however, the Cominform must first tip the balance in its own favour by transferring the industrial proletariat of Western Europe from the Western to the Eastern camp. But it has no desire to achieve this transfer by means of a devastating war. Its aims to take over Western Europe as a going concern—not as a heap of radio-active rubble. Moreover it fears above all to bring down upon itself the atomic thunderbolts of the United States. Meanwhile time means little to it; for it is convinced of the inevitability of the ultimate collapse of the capitalist world.

To speed that collapse, however, is still a commendable object, and for

this purpose the Cominform has a recipe of its own. Discontent—xenophobia—nationalism—throughout Asia and Africa, these three passions are rife, and are breeding Communists thick and fast. Thus there is no end to the bitter but localised wars which the Cominform can touch off and fight by proxy at little cost to itself and without fear of atomic retribution. So the Cominform has been busy eroding what is still left of non-Communist Asia, and now it is extending the process to Africa. These localised wars, it reckons, pay a double dividend since they impose a double burden on the capitalist West—the drain of blood and treasure spent, and the loss of markets and sources of raw materials.

Korea, Indo-China, and Malaya—all three exemplify the success of this Communist recipe. In Korea the Communists' talk of peace is merely double-talk disguised to win back ground lost on the battlefield. There seven of the United States' 22 active divisions are permanently pinned down, and American casualties are 136,000, Allied casualties over 400,000.

In Indo-China it is the same story: already by August 1952, the French Union Forces had lost 35,300 killed or missing and 43,000 disabled, and the campaign had cost France £1,250m. In consequence the same French Army that put more than one hundred divisions into the field in two world wars can contribute to Allied Land Forces, Western Europe, today no more than 12½ divisions—5½ active divisions in Germany, that is, and 7 reserve divisions in France.

As for Malaya, there we have the following security forces in action: 30,000 troops, of whom 11,300 are British and 10,500 Gurkha; 75,000 whole-time police; and over 250,000 Home Guards. The Emergency has cost us already about £82m.—and it still goes on.

To counter this Communist strategy of a back-yard approach to Western Europe, what then must be our own strategy and that of our Allies? Our main concern must still be to build up NATO's preventive strength in the West lest the Kremlin be tempted to regard Western Europe as a piece of cake and to help itself accordingly. It follows that, in dealing with the Kremlin's stooges outside Western Europe, we must not allow ourselves to be bled white. Incidentally, do not let us flatter ourselves that the Moscow-Peking axis is crumbling: its partnership in crime is paying much too well to be dissolved. Moreover, it is Moscow that directs the partnership's global strategy.

*Fas est ab hoste doceri*: ideally, we should learn from our enemies how to co-ordinate our national policies as they do on a global scale, and then to allocate our resources between the Western or primary theatre and the trouble-spots in the Asian or African backyard in accordance with this agreed policy. The North Atlantic Council, it may be argued, shows us the way. The truth is, however, that the North Atlantic Council has been possible of achievement on the part of fourteen sovereign States only because its purpose is limited; the larger conception—a global council to coordinate world policy—would never work.

The workable alternative is to hold more of those high-level meetings which Mr. Churchill and Mr. Roosevelt used to hold in the late war, and which Sir Winston, Mr. Eisenhower, and the French Premier were about to hold in Bermuda. But it is already clear that the purpose of this meeting was not to prepare a Big Four meeting with Malenkov; its purpose



was to reach agreement among the Big Three themselves as to how China is to be handled. Unless the Big Three can agree, the West is sunk, and it is Moscow's purpose to divide us. The attitude of the United States towards Red China is so much more realistic than our own. The Americans recognise Red China for the implacable enemy it is; whereas by a process of wishful thinking we persuade ourselves that the Chinese Communists are model citizens at heart, who have been cruelly misunderstood.

In the backyard where the Communists-cum-Nationalists are now playing so busily there are four main trouble-spots—Korea, Malaya, the Canal Zone, East Africa—whose demands we must weigh against those of NATO. In the past, and with the help of the Army in India, our capacity to meet all of these demands would not have been in doubt. It must be remembered, however, that Britain is now the poorer not only by 100 Indian battalions but also by the British linked battalions who used to serve in India. The new Commonwealth members, India, Pakistan, and Ceylon, lack the bonds of kinship, culture and religion that bind the older members to the Crown. From these new members we cannot count on active support in this twilight zone between cold war and hot. In consequence the British Army today is so overstrained by its commitments that it is suffering serious damage to its structure. It is vitally important to reduce overseas commitments and so ease the strain.

In Korea the peace talks have already done us incalculable harm. The other day in Canberra Lt. General Bridgeford, speaking with two years' experience behind him as Commander in Chief of the British forces in Korea, told members of Parliament that the United Nations forces have reached an indefinite stalemate. But, he was convinced, eighteen months earlier, before the truce negotiations had begun, the United Nations forces could have won an outright victory. All the facts support General Bridgeford's view, and rebut that of General van Fleet, who, since he returned to the United States, has been claiming that he still has a sure prescription for Korean victory. Even if we were to reach the Yalu—and the cost is estimated at 350,000 casualties—there would still be 400 m. Chinese Communists waiting on the other bank.

Having gained so much already by the peace talks the Communists are very naturally determined to gain more. They believe that they can count on outside pressure to force the American negotiators to concede to them all that they have failed to win in the field. There is grave danger that in this belief they may prove right. So many of us in the free world still cherish the belief that it is possible to negotiate with the Communists. We have yet to learn that, in the Communist creed, to keep faith with a bourgeois for one moment longer than self-interest prescribes is not only a crime but a blunder.

Undoubtedly it would be far better to break off the talks and to let the stalemate persist while continuing to expand the South Korean (R.O.K.) army, which already holds more than half the front. In quality that army is now at least equal to the Chinese, and there are 750,000 more South Koreans waiting to put on uniform. General Mark Clark aims to form four more R.O.K. divisions by spring 1954, making 20 in all. True, shortage of officers and equipment may well slow down the pro-

gramme. None the less this is the only safe and honourable way in which the United Nations forces can hope to withdraw progressively from the battle zone, and ultimately, in part at least, from Korea. Meanwhile these forces would be containing in Korea over 750,000 Chinese troops who might otherwise be up to still worse mischief elsewhere.

So we pass to Malaya. Through its rubber and tin, Malaya is normally the biggest dollar-earner in the Commonwealth, though the bottom has temporarily fallen out of the market. The extent of our effort to end the Emergency I have already described.

General Templer has told us that the terrorists are now beaten; that henceforth Malaya will present no serious military problem; that very soon a progressive withdrawal of the 30,000 troops—11,000 of them British—may begin. All this is good hearing. But the fulfilment of these forecasts is, I suggest, entirely dependent on the outcome of events in Indo-China, and the outcome there in turn dependent ultimately on the state of public opinion in France. Unfortunately there is a growing body of French public opinion that demands to be quit of Indo-China at any cost. The phrase so often heard on the lips of French soldiers in the dark days of 1914 is only too applicable once more: "*Si les civils tiennent.*" If they do not, all South-East Asia will be in dire jeopardy.

Whatever the French may or may not do, we shall hold on to Malaya. As to troop withdrawals from Malaya, however, it would be rash to count our chickens before they are even in the egg. We must look elsewhere for our manpower economies.

Next we come to the Middle East. In the Suez Canal Zone there is at stake a great Commonwealth base at the strategic centre of the Commonwealth. In the last war, Mr. Selwyn Lloyd told us the other day, this base "supported the equivalent of about 28 infantry divisions and 13 armoured divisions, in addition to Royal Naval units and air forces totalling about 65 squadrons." With its two-way maritime approach, its port and airfield facilities and its ample labour force, the base is ideally adapted to fighting a defensive war against Russia in the eastern approaches to Egypt; nowhere else in the Middle East could we find a comparable site. Moreover, in stores and installations we have sunk £500m. in it; to build similar installations elsewhere would cost us another £300m. and might take 30 years. Finally, so long as we continue to occupy the Canal Zone, we can ensure that the Egyptians do not do to us as they are doing to the Israelis—do not, that is, interfere with the passage of our shipping through the Canal. These are compelling motives for remaining.

The problem of the Canal Zone has peculiar properties; it stirs the emotions of those who study it to such a pitch that they can rarely discuss it objectively. That is a pity because there could hardly be a problem more difficult to solve or with more far-reaching implications. Before we consider what we should do about it, we should do well to be clear in our minds as to the setting in which we must make our decision. There are, I suggest, two relevant facts of paramount importance. First, no Egyptian Government will or could ever agree to as much as one British soldier, or even one British technician under other than Egyptian control, remaining. Secondly, if once our troops leave the Zone, then, agreement or no agreement, they will never return—unless by force of arms. When the time came, every Egyptian would be convinced that to allow our

troops back would be to call down a Russian A-bomb on his head. In the atomic age the Egyptians will not be alone in yielding to this ostrich-like urge to keep out of trouble at all costs.

In this setting we have only two alternatives from which to choose—and these are a choice of evils. Either we can agree to evacuate, or else we can defy Neguib and settle down to stay permanently. As it is, we are doing neither one thing nor the other—we are drifting; and that is not a practicable course at all.

If we decide to evacuate, we should, of course insist on a phased withdrawal of men and stores over a reasonable period: 80,000 men do not disappear at a wave of a wand, as Neguib as a soldier doubtless appreciates. But to go on arguing with the Egyptians over the maintenance of a base which we could not hope ever to regain intact is merely a waste of time. It would be far better to take our pick of the comparatively few items of plant and stores that it would pay us to remove, and to hand over the remainder to the Egyptians in return for the cancellation of Egypt's claim to outstanding sterling balances of £82 m.—a very good bargain for Egypt.

It would be all-important to re-establish friendly relations with the Egyptian Government before we went. An atmosphere of mutual trust would be our best guarantee that the Egyptian Government would not interfere with the passage of our shipping through the Canal after our troops were gone. Their prolonged ban on the passage of oil supplies for the Haifa refinery shows how little regard the Egyptians have for the Canal Convention of 1888. I believe friendly relations could be established even now. Alternatively, to attempt to negotiate a new and more watertight Convention would be fruitless, since Russia, as a party to the original Convention, would have also to be a party to any new instrument, and would certainly queer the negotiations.

A portion of the 2½ divisions which we should thus evacuate we could station in Cyprus and Malta. The remainder would be available to form the much needed nucleus of our central reserve in the United Kingdom. Thus the Army would have achieved some reduction of its commitments at last.

Such a redistribution of our forces in the Middle East would necessitate a complete reorientation of our strategy: the basing of it, that is, on the Anatolian bastion in the north; on Jordan and Iraq, in whose territories we should still retain our treaty rights; on Israel, who could meet our needs for workshop facilities and skilled manpower; and on the atomic bombing from airfields in Cyprus and Crete of Russian railheads beyond the Caucasus and the Elburz mountains. True, we might not be able again to maintain 40 divisions in the field in a future Middle East campaign, but should we want to? It is at least questionable that the Russians will ever launch a conventional invasion of the Middle East. Any advances they may make are much more likely to be engineered for them from within by Fifth Columns such as the Tudeh. If, however, the Russians should advance with horse, foot, and guns, then we should have to rely in the first place on air attack in the mountain defiles to lessen the impetus of the advance.

On the other hand, if we should decide to defy Neguib and to stay put, the decision would mean prolonged guerrilla war, and we should

clear the decks accordingly. The necessary steps would be these: to disarm all armed Egyptians within the Zone and to expel undesirables; to seal off the Zone; to accept responsibility for the maintenance of law and order within it and for the feeding of its populace some 400,000 in number; and, most important, to build proper accommodation for our troops and their families whose living standards in the Zone have been far too low for far too long.

In such circumstances we could stay put forever. Since, however, the garrison of several divisions would be fully employed in maintaining law and order, it could not be regarded as a reserve available in the event of war. Nor would the base be capable of functioning as such in a full scale emergency. Therefore we should not be fulfilling the objects for which we had stayed put.

Moreover events in the Canal Zone would not happen in a watertight compartment; they would be part of a larger situation. Thus, sooner or later, there would be repercussions in Cairo and Alexandria which would endanger the lives of the European communities, whereupon we should be in honour bound to reoccupy the Delta, an effort that might well call for a partial mobilisation at home. Moreover, since there is a solidarity in Islam which is revealed in such moments of emotion, we should surely feel further repercussions as far afield as Kirkuk and Basra and Karachi, where we have many vested interests at stake. At the same time we should find ourselves pilloried in the United Nations as an aggressor.

In the outcome what would all this amount to? A great part of our army tied down by an internal security operation in Egypt; our surviving oil interests and our Commonwealth air and sea communications threatened throughout the Middle East; a legacy of troubles in fact that might cost us much more than what we should have lost by an agreed and phased evacuation. The Golden Age of Palmerston is gone; this is the Iron Age of UNO.

There remains East Africa. From end to end Africa is in a ferment. Though at the time of writing the security forces deployed in Kenya number 40,000 and comprise eight battalions of troops, police, and Home Guard, the terrorist gangs in their forest sanctuaries will be extremely difficult to eradicate. General Sir George Erskine has just gone out to take command. No two leaders could be found better than he and Major-General Hinde, the previous Director of Operations. Together they will do everything possible to end the emergency. The possibility of withdrawing the 39th Infantry Brigade, or any part of it, however, is remote indeed.

So much for the conclusions to be drawn from this brief survey of our backyard commitments outside Europe. To sum these conclusions up: first, we must not allow ourselves to be bled white in endless wars against the inexhaustible manpower of Asia arrayed against us by the Cominform; secondly, our salvation and that of the free world depends absolutely on our maintaining a solid front with the United States—only if we cooperate militarily with the United States can we expect the United States to cooperate economically with us; thirdly, the Red Chinese are our implacable enemies, who respect force and nothing else; fourthly, the British Army, having gone straight from five years of World War II into the

Palestine, Malaya, and Egyptian Emergencies, the Korean War, and the cold war generally, has had no let-up for 14 years and is suffering grievously from overstrain; fifthly, Korea and the Middle East are the two theatres in which we have some sort of a choice between easing this strain upon our army or possibly increasing it to a most undesirable degree.

So we come to the fulfilment of our NATO obligations.

### THE FULFILMENT OF NATO OBLIGATIONS

In Germany we maintain the 1st British Corps of four divisions, three of them armoured. To reinforce the 1st Corps in emergency, we maintain also the 2nd Corps, a Territorial formation, in the United Kingdom. The date after mobilisation by which the 2nd Corps could reinforce the 1st is being advanced as far as possible by intensified Territorial Army training in a three-year cycle which terminates with divisional training. Behind the 2nd Corps is the remainder of the Territorial Army, amounting in all to the equivalent of twelve divisions. The British Army's contribution, actual and potential, to NATO is, therefore, relatively large.

The only criticism that can be levelled against it is that its Territorial reserves still receive insufficient higher training in formations to fit them to take the field by the required date, which is D+30 or earlier. That the same criticism applies with at least equal force to the reserve contributions of other NATO members is no consolation.

NATO suffers from two other major weaknesses: balanced national forces are still the rule instead of the integrated group forces that were held up as the ideal when NATO was young; and a West German contribution is still lacking.

If every one of the fourteen members maintains its own balanced force, the sum will obviously be more expensive and less efficient than if the North Atlantic Council were to integrate the fourteen national contributions in a balanced whole. National pride and jealousy of sovereign rights are of course the main obstacles to integration.

These obstacles must be overcome, however. Quantity belongs to the Russian and Asiatic hordes. NATO should prefer quality in its armaments, and quality—that is, new weapons of great destructive power—is within the technological and industrial capacity of three NATO members only, the United States, the United Kingdom, and Canada. If, therefore, there are to be balanced forces equipped with quality armaments, the balance must be struck on a group rather than a national level.

As for the Federal German contribution, we have it on the authority of General Eisenhower, Field Marshal Montgomery, General Ridgway, and every other commander of note who shares or has shared the responsibility for the defence of Western Europe that their task is impossible without such a contribution. And yet—and yet—the years roll on and nothing happens. The European Defence Community was a French invention to permit of German rearmament. Yet the E.D.C. Treaty has not yet even reached the French Parliament—and may never do so. Nor have the French any alternative to propose to the E.D.C., their own child which they now reject. Nor yet do they bestir themselves to fill the breach with their own forces. Meanwhile Eastern Germany has created an army already 130,000 strong, complete with three army group



headquarters, armour, artillery, and motorised divisions. Is NATO and Western Civilisation with it to be made the sport of French party politics?—and so to be put in jeopardy.

If France cannot suggest an alternative to the E.D.C., then her partners should do so without further delay. They should invite Federal Germany to become a member of NATO and to make a specified contribution accordingly to General Gruenther's balanced forces. This German contribution would not itself be balanced. There would be no question, therefore, of its forming the nucleus of a new *Wehrmacht*. At the same time, NATO's balanced forces would be spared that organisational nightmare, the E.D.C. Organised on simple national lines, they would be far stronger and more efficient in consequence.

H. G. MARTIN

## CHAPTER IV

### THE FIGHTING SERVICES FROM PARLIAMENT

BY IAN HARVEY, M.P.

#### POLITICS AND THE ARMED FORCES

BRITAIN'S MILITARY commitments fall into three clearly defined, though closely associated, categories. There are her Commonwealth responsibilities, her duties as a member of the United Nations, and the essential requirements of Home Defence, which include the safeguarding of the European front.

During the course of the year each of these has been reviewed in the House of Commons either during the debate on the White Paper on Defence (Cmd. 8768) or on the appropriate service estimates or during the various discussions on Foreign Policy. These last have emphasized, if further emphasis were needed, the indivisible nature of Foreign Policy and Defence. Foreign Policy without the arms would be ineffectual; Defence measures unrelated to Foreign Policy would be meaningless.

The political nature of the present military scene is so significant that it calls for a closer understanding between soldiers and politicians of their respective functions. In view of the age-old disregard in which each has held the other this is much easier said than done, but it is none the less essential.

In the sphere of Commonwealth defence the most difficult factor has been the length of our communications and the danger of dispersing our resources too widely and too sparsely. The potential source of aggression being established in the centre in a vast oppressive mass has given it a geographical advantage which has been fully exploited during what might be termed a series of perimeter excursions. Korea, Indo-China and on our own front Germany, have origins directly traceable to the Soviet Union. The Middle East and Kenya are not so attributable but nevertheless assist the general plan of troublemaking. Then there are the unexploded arsenals in India (historically a Russian goal) and Italy, so far unresponsive to the Soviet caress. Finally there are the bastions upon which an assault might well be made of Turkey, Greece, and Yugoslavia.

The lesson of this must be that in all three of our services we should be able to move far and fast with strength, and that we should thereby avoid so far as is possible tying up our resources in static blocks at various points on the perimeter.

There has been some concern in the House of Commons that this aim of mobility has not been achieved and in fact that there is weakness in that essential direction. The shortage of troop carrying aircraft in particular has caused adverse comment. The cost of maintaining the various establishments both in terms of men and of equipment has also been discussed and the old argument about teeth and tail has been fully developed by the opposition—in the same way as it was by the present

Government party when on the other side. When the state of our Home Front resources comes to be considered the problem of over-deployment is very much to the fore and does in fact suggest the desirability of a new appreciation of the situation. Politics and the military are indeed more closely allied than ever, and this should mean that there will be no military sacrifices for political ends—such as the advance into Belgium in 1940—and no political ventures which cannot be properly supported by military sanctions.

The White Paper on Defence sets out in its introduction the policy of the Government. It makes it clear that it is in a sense an interim document :

The review is now being carried further forward with the object of formulating our defence policy in the longer term, given the probable international situation, the country's economic prospects and the advent of new weapons and techniques.

These are indeed the fundamental considerations which govern defence policy. Since the White Paper appeared Stalin has died. In the House of Commons, as elsewhere, there has been much speculation as to what this will mean. As this Chapter goes to press a further debate on Foreign Affairs is pending and the negotiations in Korea are dragging on into their second series. Some of the gilt is already off the Malenkov gingerbread. For many the Russian Peace offensive is merely a "Recueillir pour mieux sauter". Stalin missed the bus if he wished to launch a "blitz krieg" when he went no further over the Berlin airlift. The West is now better prepared, although by no means ready, to overcome a major onslaught and is sufficiently equipped to inflict that element of delay which would spell Stalingrad in reverse.

Some think that Malenkov is changing Stalinist policies for the sake of popularity and because he wishes to identify himself with a new regime. That may well be true. But it does not in any way justify a reduction in preparedness.

As the White Paper puts it :

If the risk of war has receded in past months (*and Stalin was not then dead*), the cause has been the growing power of the Western Nations ; but there is still much to do before that strength is sufficient and the effort must continue.

It is over this question of the recession of the threat of war that there has been the greatest political controversy in the House. It has centred around the two issues of National Service and the percentage of the National resources now being directed to defence.

The National Service attack was led by Mr. Shinwell, although when it came to the final onslaught his position was somewhat invidious as it transpired that he did not in fact speak for his party. There ensued the somewhat unusual spectacle of an ex-Minister of Defence speaking from the front bench yet not on its behalf. Mr. Shinwell's argument was that as the threat of war had receded it should be possible to reduce the period of National Service from two years to 18 months after review. The Government has not at any time rejected the proposal that National Service should be kept continuously under review, and of course the procedure of passing an annual Army and Air Force Bill constitutes the occasion for doing this. It seems, however, an odd procedure to announce

that the period of National Service should be reduced before that review has in fact been carried out. The Government during the course of the Defence debate made it abundantly clear that the policy to maintain the two years National Service had only been arrived at after all the factors had been carefully weighed up. The two main theatres in which National Servicemen are employed, namely Korea and Malaya, present an unsurmountable geographical argument against the reduction of the period.

Mr. Churchill summed up the position when opening in the debate on 5 March.

Let me emphasise the effect on the Forces of cutting six months from the period of National Service. It is during the last six months of his service that a man becomes a well-trained soldier. Very likely he is an N.C.O. or has gained a commission. I am told that a reduction from 24 to 18 months would strike from the Army over 10,000 corporals and lance-corporals and about 18,000 young officers who have come up from the ranks. Perhaps we may call them all the flower of our military youth. This ill-timed and ill-aimed stroke would not reduce the intake of the National Servicemen nor the number needing to be trained. There would be no saving in training overheads. The total number in the Army would be less. The proportion in the training establishments would be larger and the general result undoubtedly inferior.

But look at the effects of such a change upon our overseas obligations at the present time, when all our divisions are abroad, spread about the world, many engaged in some form of warfare. To cut six months off National Service would reduce the period which National Servicemen could spend in Korea from 11 months to 5, in Malaya from 16 months to 10, and in the Middle East from 19 months to 13. Thus if we are to continue to discharge our present commitments the use of National Servicemen in the most distant theatres would simply mean more movement and less result.

I have dealt with the consequences to the British Army. The effect on the Royal Air Force would, in general, be very similar.

The Government's policy with regard to the future of National Service is outlined in the White Paper on Defence, Paras 32-37, and it is indicated there that a bill will be placed before Parliament to extend the scheme of National Service for a further five years.

The much needed clarification has been made with regard to Z and G Reservists. In their case it is indicated that the proposed legislation to extend the reserve liability of National Servicemen will limit the recall of Z and G Reservists to those of 45 and under.

The Defence budget for the year 1953/54 is the highest ever known in peace time. It is broken down under its principal headings in an annexure to the White Paper (Annexure II), which is shown in the Reference Section—Statement on Defence (Cmd. 8768) on pages 420-440 of this book.

### THE THREE SERVICES

The White Paper on Defence states that "the emphasis in the Naval new construction programme as in 1952/53 will be on the building of ships for minesweeping and anti-submarine duties; on the progress and completion of aircraft carriers and the provision of some modern aircraft for operation from them and for shore training." This is, to all intents and purposes, the major reference to the Navy in the White Paper.

It is not without significance that the accompanying statement on the Navy estimates (Cmd. 8769) is a very modest document compared with the very full memorandum by the Secretary of State for War (Cmd. 8770), and the more brief, though none the less informative document from the Air Ministry (Cmd. 8771).

It was not therefore surprising that Captain Ryder, V.C., Member for Merton and Morden, should have felt compelled to rise in his seat at the conclusion of the Defence debate to complain that no reference at all had been made to the Navy during the course of that discussion.

Any spectator of the parliamentary scene will moreover be bound to admit that during the past year the Navy, although admirably represented, by the First Lord, Mr. J. P. L. Thomas, has not featured to any great extent in the deliberations of the House of Commons. It may be argued that this has been due to the fact that the activities of the Senior Service have not involved it in any major political controversy. It may also be suggested that there are fewer ex-representatives of the Navy in the House than of the Army and the Air Force. Finally it might be claimed that it is the justifiable prerogative of the silent Service to remain aloof. None of these arguments is, however, convincing, and there is in fact a very serious danger that at a time when National Service impinges numerically in greater numbers upon the other two arms when major developments are more prominent in the air and on the land, the Navy would seem the least important in the eyes of Parliament.

No matter how changed our strategic situation may be as the result of the development of air power, it must never be forgotten that as a Commonwealth community with long lines of sea communication the command of those lines rests with the Navy. Nor can there be any doubt as to the superiority in naval technique which we still command.

The actual strength of the Fleet at the present time is shown in the Navy White Paper at the head of the following page.

The critics of Government policy have concerned themselves mainly with expressing the view that the Navy is in fact being cut back too far. While it is agreed that quality can to a certain degree offset quantity, there are limits beyond which this cannot go, and there is some reason to believe that the critics of this action are not altogether wrong.

The Secretary of State for War in his White Paper has on this occasion introduced a new and interesting procedure of including detailed accounts of activities in the various theatres based upon first hand reports. As a result this personal touch has made this memorandum more vivid and more convincing. For instance the hand of the Commander in Korea (General Roberts-West) is easily discernible in the sentence "Things are tough and getting tougher, but so are we."

From the British Army of the Rhine comes the report that on the 1st December, 1952, the title of the Headquarters of the Commander-in-Chief was changed from "Headquarters British Army of the Rhine" to "Headquarters Northern Army Group." It comments "the significance of this change is that it brings out the allied responsibilities of the Commander-in-Chief, who in addition to commanding the British Army of the Rhine in peace is the Commander designate in war of the Belgian, Netherlands, and British Forces, who form the Northern Army Group of the Allied Land Forces Central Europe".



## STRENGTH OF THE FLEET

The table below shows the strength of the Fleet in classes (excluding vessels of the fleet train, attendant ships and numerous small craft):

	Active Fleet	Training and experimental (Special complements)	In Reserve, reducing to Reserve	In course of construction*
Battleships . . .	Vanguard		Anson Howe Duke of York King George V Victorious (a)	—
Fleet Carriers . .	Eagle Indomitable	Indefatigable Implacable Illustrious Triumph		Ark Royal
Light Fleet Carriers	Theseus Glory Ocean		Warrior (a)	Hermes Bulwark Albion Centaur Majestic (d) Leviathan (e) Hercules (e)
Aircraft Maintenance Ship employed on Trooping Duties	—	Perseus		
Cruisers . . .	11	2	13	3 (e)
Destroyers . . .	31	9	67	3
Frigates . . .	31	17	113 (b)	13
Fast Minelayers . .	2	—	1	—
Monitors . . .	—	—	2	—
Submarines . . .	37	—	16	—
Minesweepers: . .				
Ocean . . .	23	3	38	—
Coastal . . .	17	9	43	47
Inshore . . .	8	2	33 (c)	48

\* Excludes submarines.

(a) Modernising.

(b) Excludes three refitting for loan to India, three refitting (in Denmark) for loan to Denmark, two refitting for loan to Norway.

(c) Includes those being fitted out for minesweeping.

(d) To be transferred to the Royal Australian Navy on completion.

(e) Work suspended (see Navy Estimates 1953-54 pages 231-232).

In opening the debate on the Air Estimates the Under-Secretary of State for Air, Mr. George Ward, quoted a statement by the Prime Minister made at Boston in 1949 "For good or ill air mastery today is the supreme expression of military power and fleets and arms, however, necessary, must accept a subordinate rank." However partisan Members of the House of Commons may be with regard to the various Forces—there are still one or two who are not particularly friendly to any—there must be general agreement with regard to that statement. It was in fact not contested.

The Under-Secretary outlined the three tasks of the R.A.F. which he said were "Firstly, to provide in conjunction with the Commonwealth and N.A.T.O. countries a powerful deterrent. Secondly, if that deterrent should fail, to defend the United Kingdom and to make a contribution to commonwealth defence and the joint defence of N.A.T.O., and finally, to meet our obligations in the 'cold' war."

The White Paper on Defence shows the total strength of the active forces in April 1953 and in April 1954 as being estimated as follows (the figures for 1952 have been added for comparison):

				<i>(Thousands)</i>		
				<i>Actual</i>	<i>Estimate</i>	
				<i>1 April</i>	<i>1 April</i>	<i>1 April</i>
				<i>1952</i>	<i>1953</i>	<i>1954</i>
Regulars	..	..	..	521·8	541·7	552·5
National Service	..	..	..	317·7	313·6	287·7
Women	..	..	..	23·2	24·5	26·2
Total				862·7	879·8	866·4

Within these totals the strength of the Army will remain constant during 1953–54, while that of the Navy and R.A.F. will decline by about 10,000 and 3,500 respectively. In the Navy the reduction in strength is due to the termination of measures for the compulsory retention of regulars and the recall of reservists. The reduction in the size of the R.A.F. arises mainly from the smaller training organization required to support the reduced rate of front-line expansion now contemplated.

## EUROPE AND THE HOME FRONT

The most controversial aspect of our military programme so far as the political arena is concerned has been the Government's policy with regard to the European Defence Community. In the White Paper this is finally summed up in paragraph 86, which reads as follows:

The Treaty establishing the European Defence Community (E.D.C.) was signed on 27th May 1952 by France, Belgium, the German Federal Republic, Italy, Luxembourg and the Netherlands, but it is still awaiting ratification. The United Kingdom has explained her inability to become a member of the Community, but has shown her readiness to collaborate with it by signing an agreement establishing mutual security guarantees between the members of the Community and herself and by joining with the United States and France in a declaration of her abiding interest in the strength and integrity of the Community. The United Kingdom has also advised the E.D.C. Interim Committee that the British forces on the Continent would collaborate closely with those of the Community and could be associated with them in matters of training, administration and supply. United Kingdom observers are participating in the military planning preparatory to the establishment of the European Defence Forces.

The Prime Minister himself, both in the Defence debate and on subsequent occasions, has underlined the reason for this policy, which is that the United Kingdom having priority Commonwealth commitments cannot be expected to allow any of its resources to be placed unreservedly beyond her control in any one theatre. This is an attitude which is not altogether appreciated by France whose military spokesman in the person of Marshal Juin has suggested that without full British participation E.D.C. is liable to become dominated by the German military element. Remembering the history of Franco-German relations since Bismarck it is quite easy to appreciate the Marshal's point of view and the fears of the French nation, a high percentage of whose military strength is committed in the Far East. Nevertheless the dominating factor in Western

European relations is the necessity for bringing Western Germany into full harmony with her neighbours. If that is not done and done quickly there is the obvious corollary that she will look eastward. Undoubtedly one of the most telling arguments against her adopting that policy at the present time has been the handling of Eastern Germany by the Soviet Union, where the same mistakes are being made as the Germans themselves committed in the Ukraine during the War.

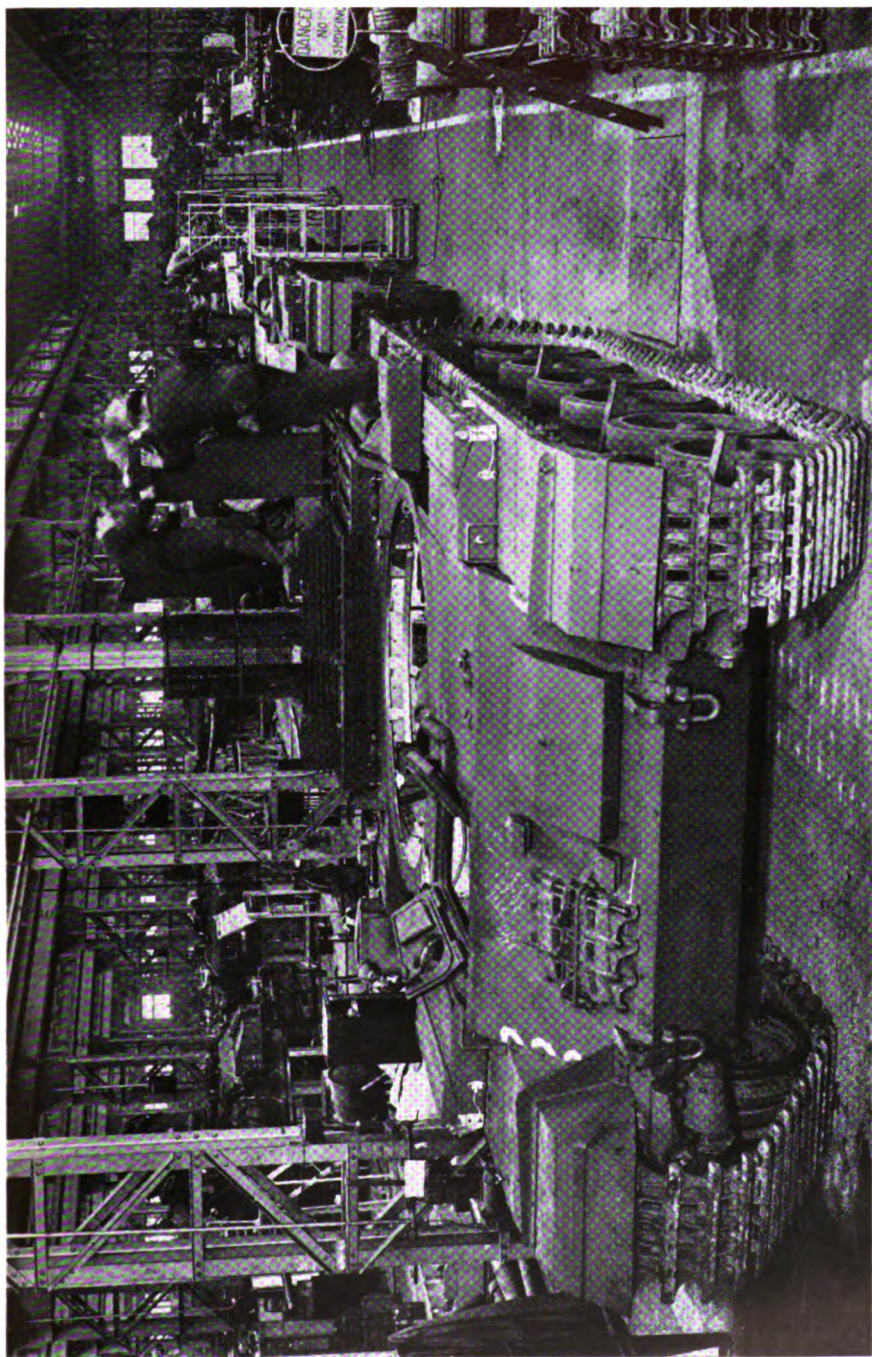
It is imperative that the Western Powers should divest themselves of their war memories if the E.D.C. is to succeed. It must be an alliance based on trust. Any suggestion that we should become full members in order to perform a balancing act would make it clear that that trust did not exist. Such an alliance would be doomed to failure and would mean a continuous and uncontrolled drain upon our resources with disastrous results elsewhere.

It was Mr. Strachey in a profoundly interesting speech who pointed out the extreme danger of deploying all our forces without having any kind of reserve. No one will deny the wisdom of that view point and the soundness of the military principle upon which it is based. The former War Minister was naturally asked how it came about that he himself had not made such a provision, nor was he as Minister on record as having referred to the lack of its existence. Nevertheless the immediate problem, for which he provided no adequate solution, is to define the commitment which can safely be given up in order to provide such a reserve. Assuming that the plan of the potential aggressor is to keep all our resources continuously deployed around the perimeter, it seems unlikely that there will be any voluntary co-operation from that direction. It was suggested by those who supported Mr. Strachey's argument that withdrawal from the Middle East could provide the basis for a reserve to be kept in this country. Events subsequent to the debate tend to falsify that suggestion.

Undoubtedly the provision of a reserve can only be achieved in three ways, each of which is likely to be long-term. Firstly there is the reduction of existing commitments; but then there is the obvious probability that new commitments will be created to take their place. Secondly there is the development of military methods and measures which will enable existing commitments to be met by smaller forces, or forces maintained at a distance. Third there is the necessity for other members of the United Nations providing the full quota of their military contribution.

The situation with regard to reserves appears even more unsatisfactory when the position of the home front is reviewed. It is in this direction that the White Paper is least convincing. Reference is made to the organization and training of mobile columns from service schools, training units, depots and other static establishments. Anyone who had experience in the last war of this type of unit knows that such forces are liable to be of an emergency nature. This picture is not in any way improved by the statement that "These columns are supplementary to the Home Guard." It is upon that subject that there has been some considerable uproar in the House.

The Secretary of State for War has been forced during the year to reduce the original target for the Home Guard. He has been challenged from the Socialist benches, and particularly by the former Under-Secretary



Britain's Armament Industry. Turning out Centurion Tanks in the Royal Ordnance Factory at Barnbow, Leeds



Mr. Woodrow Wyatt, to prove that the Home Guard is in fact any use at all. It is unfortunate that this voluntary arm of the service should have come in for this storm of political criticism. There is little doubt that that has served to hamper recruitment. Even the most ardent supporters of the Secretary of State feel however that the matter does require further attention. The present Home Guard is altogether too like its predecessor, with the obvious disadvantage of not having any real crisis incentive to promote recruitment. It would seem logical that with the Territorial Army now fulfilling a new role as a link between the regular army and the national serviceman, and providing the necessary machinery for immediate and efficient expansion, the Home Guard should be looked on in much the same light as the Territorial Army used to be. There is in fact a strong case for the closer integration of the Home Guard with the Territorial Army and it is to be hoped that this will be the subject of an early review.

In the Memorandum on the Army Estimates occurs this modest statement "The study and design of guided weapons has continued. These show great promise and will be vastly superior to the present orthodox type of weapons."

Subsequently the Minister of Supply has given further details with regard to these developments and the Minister of Defence has announced that the Government's policy is that these weapons are to be manned by the R.A.F. This will constitute a major re-organization of the anti-aircraft defence of this country. During the course of the debate on the Army Estimates there was criticism that too much money was being invested in anti-aircraft installations, which were already obsolescent. The Under-Secretary of State, Mr. Hutchison, rejected this view, although he did not support it with any convincing arguments. But the fact that anti-aircraft guns as such will not be used for directing guided missiles must automatically make anti-aircraft weapons obsolescent. It is true that in this direction it is important not to scrap the old until the new is ready, and quite obviously a line of "user practice" must be drawn considerably behind the line of experimental development.

The general complaint with regard to Anti-aircraft at the present time is that this line is drawn too far back. In fact there is little to choose between the anti-aircraft instruments and procedures of today and those of 1945. There is on the other hand a great deal of difference between the targets then encountered and those we might now expect to receive. There is moreover still the danger that Anti-Aircraft Command should be filled with men who are coming to the end of their military careers or those who are not required for more active pursuits. All this will be overcome by the new decision to integrate under the R.A.F. all air defence. Quite obviously this is the right policy in view of the immense speed of aircraft and missiles and the necessity for seeing that all measures of defence are under one control. It will also solve at last the old and tiresome problem of air co-operation training in whatever particular form it may ultimately emerge.

Some difficult questions of tradition and loyalty will have to be solved because Anti-Aircraft Command at the present time contains a number of Territorial Units of long and honourable army standing. The Minister of Defence has, however, assured the House of Lords, and the assurance



has been confirmed in the Commons by Mr. Birch, that this is a long term policy which will take some considerable time to work out. In the meanwhile it would seem that the words of paragraph 4 of the White Paper will have to be borne in mind with regard to Ack Ack, namely "We must avoid committing ourselves too deeply to equipment which will have to be replaced at heavy loss within a relatively short space of time."

Once again there is an apologetic postscript to the White Paper on Civil Defence. This does not strictly fall within the orbit of the fighting services, but the significance of Civil Defence with regard to our military preparedness is of increasing importance. In the first place the Chiefs-of-Staff would appear to have estimated that the home front can look after itself because the Regular and Territorial Armies, together with their National Service component, would be deployed overseas within six months of the outbreak of hostilities. From the picture already available it is obvious therefore that something more than the Home Guard, Anti-Aircraft Command and the Mobile Columns based on home establishments is required.

At the present time the Army and the R.A.F. are contributing detachments to form a prototype Civil Defence Mobile Column, and by the end of the year some valuable experience should have been obtained from this. Much more important, however, is the implication of the role of such a column. It would seem not beyond the bounds of possibility that many of the functions at present assigned to home base troops would in fact be undertaken by such organizations. This would of course at once raise questions of the Geneva Convention and combatancy. It is however very difficult to define in total war who is and who is not a combatant. Total war does in fact involve total defence and it would seem desirable that the whole conception of the role of the Civil Defence services and their integration with the armed forces should be reviewed.

A recent report by the Mabane Committee has advised that Civil Defence should be regarded as the 4th arm. The Home Secretary in the name of the Government has endorsed this recommendation. It is not enough to use such phrases, the important thing is to turn them into practical reality. A fourth arm of defence, if it means anything, requires command and control. It requires also equality of status with the other three arms. To achieve this radical re-organization and a new outlook is needed. Both must be forthcoming during the course of the next few years.

### THE MILITARY CODE

Last year there was a considerable scene in the House of Commons on the subject of the Army and Air Force Annual Bill. This was generated very largely for party political reasons connected with the timetable of the House of Commons. It was based, however, upon substance of a really genuine character. The Army and Air Force Acts contain much that is out of date. Furthermore there exist in both Services practices which have as their origin Queen's Regulations, Rules of Procedure and other instructions which are not statutory.

The Government therefore decided to appoint a Select Committee to consider the reform of the Army and Air Force Acts. This Committee began to sit in the last session and was re-appointed in this. The following

are Members: Mr. G. H. C. Bing, Mr. E. R. Bowen, Wing-Commander E. E. Bullus, Col. Alan Gomme-Duncan, Air Commodore A. V. Harvey, Mr. Ian Harvey, Mr. Arthur Henderson, Mr. James Hutchison, Mr. Basil Nield, Mr. R. T. Paget, Brig. O. L. Prior-Palmer, Sir Patrick Spens, Mr. Michael Stewart, Mr. George Wigg and Mr. Woodrow Wyatt. The Chairman is Sir Patrick Spens.

At the same time a Departmental Committee is sitting and giving the Select Committee the benefit of its expert advice. Representatives of the Departmental Committee, together with parliamentary draughtsmen attend the meetings of the Select Committee, and as a result recommendations with regard to the reform of the Acts are produced.

The Committee is dealing with the Acts part by part, and so far it has made two reports, the first covering Part 3 and the second covering Part 2. These were considered to be the least controversial parts and as a result swift progress was made with them. The Committee at the present time is reviewing Part I which is the most complicated and a report on this is still awaited by the House. Part 4 is of a miscellaneous nature which can more easily be dealt with when it has been decided what to include in the first three parts. Part 5 containing definitions is dependent on what is decided in the other four parts.

As a result of the work on the acts the Army and Air Force Bill for 1953 was of a purely formal nature, and although there was a short discussion on the subject it went through without difficulty. It is anticipated that with the present rate of progress the major work of the Select Committee will be complete during the course of the next nine months.

This would be no mean achievement when it is recalled that the last Select Committee on the subject sat for six years. The progress made to date is a tribute to the wise Chairmanship of Sir Patrick Spens the Member for South Kensington and a former Chief Justice of India. The members of the Committee comprise some of the most ardent controversialists in the House, some of whose views on military subjects, as on others, are diametrically opposed. Yet the proceedings have been remarkable for their concord and for the fact that party political strife has been absent. This is all to the good because it is essential that the forces and all matters concerning them should be kept out of the realm of party political controversy.

It is at the same time most desirable that the code which governs the services should not be in any way oppressive or anachronistic. With the coming of National Service the nature of the Services has undergone a radical social change. They are no longer specialist and voluntary elements; they are part of the life of the community. That means that Parliament, which has decided that men shall serve in the forces for a specified period, has an especial obligation to the community to see that service life is productive and not stultifying. The services on their part have a great responsibility both to the men who are compelled to join them and also to themselves. Never before has there been so fruitful an opportunity for recruitment. Conversely if men hate their service period recruitment will decline and the forces will reap a whirlwind of national unpopularity. The figures for recruitment show that the forces have in fact realized this and they are doing a remarkably fine job. The intelligent reform of the military code is one of the ways in which this task

can be promoted. The members of the select committee have also a great responsibility in the matter. It is already clear from the two reports published that they realize this.

So far there is no indication that the Naval Discipline Act is to be revised. There is however a naval representative on the departmental committee. It may well be that the reward for duty done on the other two Acts may be that the Committee will be asked to consider the third.

### SUMMARY

It is heartening to record that with a House of Commons so equally divided and during a year when much controversy and not a little bitterness have prevailed the measures proposed and taken with regard to the armed forces have not been caught up in the storm.

This is as it should be. It would be disastrous for military policy and planning if it were subject to change or threatened change with every political move.

As a result of the Government's decision to adjust the armament programme there is less divergence of view on the economic issue than there was a year ago. This adjustment has caused a somewhat curious political position because it is to a certain extent in line with the point of view expressed by the Bevanite faction of the Socialist party and previously rejected by Mr. Attlee and his adherents. The Government's decision was however taken not on the grounds that too much was being spent on defence but that the original programme was indigestible and unworkable in the time and under changing conditions of development.

The fact remains that a vast financial commitment has now to be met by the country in the upkeep of its military resources. This is also reflected in the deployment of manpower on military activities instead of in the factories. To the question "Can we afford it?" there is only a dubious "Yes." On the other hand to the question "Can we afford not to have it?" there is a definite "No."—that is to say from most people who are not of the opinion of Mr. Crossman, who declared in the Defence debate "Hon. Members opposite (the Conservatives) say we must keep up our pretensions and remain a great power even at the cost of over committing ourselves. I suggest we get out of 'the big house' we have been living in. Any sensible man who has a big house he cannot afford takes a three bedroomed house that he can afford and I suggest that a neat three bedroomed house is much more comfortable than a big country house with huge unheated rooms. It is a choice of that sort that faces us in planning our defence today."

It is precisely because it is not a choice of that sort that we are faced with the defence expenditure that is ours today. If we were in fact for our own personal gain and ambition over-reaching ourselves, then the views of Mr. Crossman and his colleagues might have some substance. It is however not a choice between a big and a small house. It is a question of walking the world with dignity or of being kicked around behind barbed wire. Mr. Crossman might find his description of the neat three bedroomed house somewhat inappropriate when viewed from an overcrowded hut in Siberia.

The more realistic approach must be to analyse the commitments, and

the resources required to meet them and to see if either can be reduced. Wastage is not always a matter of carelessness or of extravagance; it is quite often the outcome of false appreciations, unsound plans and out-of-date conceptions. It is not only a review of the methods by which policies are carried out which is required, but also one of the minds which produce the policies. Moreover in the second half of the century there are political realignments to be considered which can vastly affect the balance of resources. The example of Yugoslavia springs to the mind. This is also an encouraging prototype for Soviet satellites. Turkey has great potential resources. Spain should not be left outside the family. China is by no means an unchallengeable Communist reserve, although unwise policies might make her so for many years to come. Germany has a great potential for the balance although it must not be so mobilized to the detriment of France. Japan will rise again.

These considerations are properly the concern of the politicians but the implications are equally those of the military. As was suggested at the beginning of this chapter the close co-operation between the two is fundamental to the effectiveness of our political objectives and to the coherence of our military machine.

IAN HARVEY

## CHAPTER V

### THE NEW WARFARE OF THE 1950s

BY BRIGADIER C. N. BARCLAY

#### INTRODUCTION

THE FAMOUS German military writer, Clausewitz, defined war as "a continuation of policy by other means," implying that nations normally attempt to gain their ends by peaceful methods and only resort to fighting when diplomacy fails, and they think that war may be profitable. Clausewitz lived before the days of total war on a world-wide scale, and before the invention of atomic weapons. In his day, although an unpleasant experience, it was not fraught with the disastrous consequences of twentieth-century war. He obviously did not contemplate any intermediate stage between peace, governed by the formal and polite diplomacy of his generation, and full-scale war as it was known at that time.

It is the theme of this article that an intermediate stage exists to-day—world conditions which are not peace, but are not full-scale war.

In recent years we have become familiar with the expression "cold warfare." The numerous attempts to define the term have two factors in common—namely, that it implies mischief and annoyances by all means, except actual armed hostilities; and all convey the impression that it is a monopoly of the Soviet Union and her satellites.

It is clear that the term "cold warfare" is not sufficiently comprehensive to describe the measure of hostility between Western Democracy and Eastern Communism now existing. "Cold warfare" is only part of the process, which in its entirety consists of:

- |   |   |   |
|---|---|---|
| (a) <i>Propaganda.</i>  | } | Included in the term "cold warfare."          |
| (b) <i>Underground activities.</i>  |   |   |
| (c) <i>Obstruction and planned inconveniences.</i>  |   |   |
| (d) <i>Armed threats, as exemplified by the immense forces which face each other in Europe and elsewhere.</i> | } | Might be included in the term "cold warfare." |
| (e) <i>Limited war, as in Korea and Indo-China.</i>   |   |   |
| (f) <i>War and guerilla operations by proxy, as in Korea, Indo-China, Malaya, etc.</i>                        |   |   |

It has become synonymous with the term "cold warfare" that the activities which it embraces are a monopoly of Russia and her friends—something which the Free World recognises and attempts to counter, but which it disdains to practise. This is a dangerous idea which, if it persists, will give the Soviet the permanent initiative in whatever we may call the hostile activities between East and West.

The sooner the term "Cold Warfare" is discarded the better. It does not describe present activities accurately, and it assumes a one-sided initiative which is detrimental to the Free World.

It is considered that the term the *New Warfare* is a good one to describe

*all* the hostile activities and processes, direct and indirect, moral and material, which are employed in the struggle between Democracy and Communism.

It will be as well to state here that the term "Communism" as used in this article, has no reference to the original meaning of the word; but is used to describe the Soviet form of so-called Communism, which is almost indistinguishable from Nazism and Facism.

#### WARFARE—AN HISTORICAL SURVEY

The student of medieval military history is at once struck by the small size of the forces which decided great issues and the fate of kingdoms. At Hastings in 1066 the future of our race was decided by rival armies each of little more than the strength of a modern brigade group. Henry V won the Battle of Agincourt with an army of approximately 6,000 men. These small numbers were not due to lack of enthusiasm, but were definitely imposed by the conditions of the times. Communications were poor and it was difficult to assemble and maintain large forces. The bulk of the population, in all countries, lived at near-starvation level, and any large or prolonged withdrawal of adult manhood, for war purposes, would have resulted in serious privations. "Credit" finance had not been invented and the war was usually paid for from the monarch's private treasure chest—which was not always in a flourishing condition. As a result the consequences of war, except for the actual participants and those in the area of combat, were not normally very serious. A compromise peace was usually arranged and in a few months the inhabitants of the contesting nations settled down again to their primitive lives.

By the time of the Napoleonic wars communications had improved, weapons had become more effective, "credit" finance had been introduced, and considerable advances had been made in organizing technique. This enabled much larger forces to be raised, and maintained for longer periods. The Grand Army with which Napoleon invaded Russia consisted of about 450,000 men and at Waterloo the contestants comprised—Napoleon, 124,000; Wellington, 93,000; and Blucher, 120,000.

By the Franco-Prussian War of 1870–71 the advent of railways, improved road communications, and developments in weapons had made war a much more serious business. The Germans started the war with a field army of some 520,000 men and 1,600 guns. The French were slower to mobilise, but eventually put into the field about 390,000 men and 1,250 guns.

This, the last war between European powers to remain localised, put a severe economic strain on the combatants; but it was not a crushing one. The peace terms imposed on France, regarded as severe at the time, would be considered lenient to-day. Indeed, the indemnity of 5,000 million francs (£200,000,000) seems to us a trifling sum, and was in fact paid off by September, 1873.

The two Great Wars of this century were in a totally different category from previous contests. They were world-wide in scope. The invention of aircraft, the size and speed of surface warships, the advent of the



submarine, and the increased range and speed of land transport, made it possible to spread death and destruction far and wide on a great scale.

The cost was immense, as the following figures show:

At its peak the 1914-18 War was costing Britain more than £5,000,000 per day.

The shells in the opening bombardment at the Battle of Messines in May, 1917, cost £17,000,000.

Between 1914 and 1918 25,500 guns and 55,000 war aircraft were manufactured in the United Kingdom.

These figures were eclipsed in the Second World War, when at one period Britain spent £9,000,000 and the U.S.A. about £16,000,000 per day, for war purposes.

This scale of expenditure was made possible by the complex system of "credit" finance which has been built up in modern times—a system which enabled immediate needs to be met, but which could not prevent economic chaos as the aftermath. The First World War upset world finance and economic equilibrium to such an extent that recovery was not complete before the second contest started in 1939—a war which was to complete the evil process which we thought had ended in 1918.

In a period of little more than thirty years we have waged total war on a world-wide scale for ten years. This has produced social and economic consequences, and an aftermath of hatred, which is indeed sad to contemplate, when one realises what might have been if mankind had shown more sense.

Within the present decade a new and revolutionary weapon has been invented, as yet hardly used in war. Until 1945 the effect of warlike missiles was purely local. The lethal effect of the detonation of a shell or bomb was at the most a few hundred yards and normally less than one hundred. The Atom Bomb, on the other hand, is a weapon of obliteration, capable of destruction over an area of several square miles, accompanied by slaughter on an immense scale and a serious radio-active aftermath lasting for days or weeks. It is probable that in the event of another full-scale shooting war the leading powers would possess sufficient missiles of this type to cause death and destruction on a scale far exceeding anything experienced in the First and Second World Wars.

As a result of this brief survey of the history of war, and recent developments, we are able to form certain conclusions:

(a) That up to 1914 mankind conducted war on a scale which his economy was capable of supporting.

(b) That the two world wars conducted between 1914 and 1945 were on a scale beyond our resources, and have brought the whole world to the brink of social disaster and economic ruin.

(c) That in view of the already exhausted condition of the world and recent inventions, particularly the Atom Bomb and other nuclear weapons, it is highly probable that a Third World War would result in conditions of complete chaos and bring about the ruin of both systems of society—West and East.

We, therefore, have two conflicting trends in world affairs:

Firstly—The intense antagonism between the two ideologies of

Western Democracy and Eastern Communism, which in any previous age would have already resulted in full-scale war.

Secondly—The realisation, by the leaders of both groups, of what modern war means and the disastrous consequences for *all* if another shooting war starts.

In other words the nations are in warlike temper, but they shrink from another total war through fear of the outcome. As a result they have invented, and are practising, a new sort of warfare, outlined in the early paragraphs of this article, and which we call the New Warfare. This, so long as it lasts, enables them to give vent to their hatreds and dislikes; but avoids complete chaos, although its effects are very severe, both economically and socially.

#### THE PRESENT SITUATION

When, in 1945, the war ended with the defeat of all who we had regarded as enemies, the prospects of an era of peace, and the dawn of permanent world prosperity, may have seemed remote, but by no means fanciful. Prior to his death President Roosevelt had high hopes of a satisfactory post-war Anglo-American understanding with the Soviet, and when hostilities ended we were in the mood to accord Russia pride of place in the defeat of Germany. All this was very soon nullified, and it became apparent that Russia was obsessed, or pretended to be obsessed, with fears of encirclement by her late Allies, led by America and the British Commonwealth. Whether or not this attitude was based on an honest, but mistaken, belief, it soon became apparent that the Soviet had a carefully prepared plan for promoting World Communism by means which, it seemed, fell short of full-scale war. Events since then confirm the view that in the Kremlin the war-time alliance with the Western Countries was merely a friendship of convenience, and the war merely an incident in the march of Communism.

As the post-war years passed the technique of the New Warfare was revealed, and it will be convenient here to discuss, very briefly, the methods by which it has been, and is being, conducted.

#### PROPAGANDA, UNDERGROUND ACTIVITIES, AND OBSTRUCTION AND PLANNED INCONVENIENCES

These are the activities of cold warfare with which we have become familiar. In some cases the methods employed are generally accepted as legal—such as advocating Communism in the press or by speech, which in many countries, France and our own among them, are perfectly legal. For the most part, however, they are illegal, or contrary to custom among respectable nations, and consequently carried on in secret.

Propaganda is, of course, employed universally by politicians, manufacturers advertising their wares, ministers of religion—in fact, all who sponsor a cause or project. In international affairs it is practised in peace and war and has two aspects:

##### (a) *For home consumption*

To stimulate the morale of one's own people by acclaiming the skill, and virtues, of the leaders, and the excellence of everything they do and advocate.

(b) *For outside consumption*

To depress the morale of one's opponents, in war or in the kind of "peace" to which we have become accustomed; to cause dissension among allies; resentment against the government, and even encourage revolution or civil war.

The means of spreading propaganda are familiar to all—press, radio, speech, direct approach, etc.

The Soviet has had considerable success with the morale-raising type of propaganda for home consumption. The Communist regime is undisputed in Russia and firmly established in most of the Satellite States. Communists the world over show an enthusiasm which seems remarkable to us for such an unattractive doctrine.

Propaganda for export meets with varying success, according to the ground on which it is sown. With backward races considerable success is attained, which would be even greater were it not for the difficulty of conveying it among people who cannot read and do not generally possess wireless sets. In countries with a good standard of education Communist propaganda is often successful where war conditions have created economic hardship or unstable government—France, Italy, and Japan. In our own country results have been insignificant; but, nevertheless, demand vigilance. Almost the only success attained has been through the direct approach in which Communist agents, or sympathisers, operate among Trade Unionists, scientists, students, intellectuals, and others.\*

It must be borne in mind that Communist successes attributed to propaganda are very often due to other causes—bribes, blackmail, etc.

Underground activities are legion in form and scope. Whilst propaganda is often within the law, and carried out openly, many activities, however, are illegal and are therefore carried on underground. In its mildest form it includes subversive activities (in reality illegal propaganda), ordinary espionage to uncover political, military, and industrial secrets and minor sabotage. In its more extreme form it aims at major acts of sabotage, armed partisan activities, or even revolution and the overthrow of government. It is unnecessary to quote examples to illustrate this very wide term. We are all familiar with the rape of Austria (1938), Czechoslovakia (1939 and again in 1948), and the methods by which Estonia, Lithuania, and Latvia were brought within the Soviet Empire in 1939. These performances were not carried out exclusively by underground means; but, in every case, it played a big part in the "softening-up" process which preceded the *coup de grace*. We can be certain that this branch of the New Warfare is being waged on a great scale everywhere; but it is difficult to assess because, as the term implies, it is not a technique which is advertised.

Most activities in the New Warfare are merely old methods brought up to date and used in a new guise. Recently, however, there has been a

\* Those who desire detailed information concerning the direct-approach methods employed by Communists in Britain should read *The Communist Technique in Britain*, by Bob Darke—himself an ex-member of the British Communist Party (Collins, 10s. 6d.).

development which is new—the system of Obstruction and Planned Inconveniences. In the days of the old diplomacy, before the rise of Mussolini and Hitler, there was always a façade of formal politeness until hostilities actually started. All this has been swept away and to-day we have incidents, occurring almost daily, which are highly provocative and which, under the old order, would have resulted in a severance of diplomatic relations and possibly an ultimatum followed by war. On the higher level are the “blockade” of West Berlin, resulting in the “Berlin Air Lift” of 1948, and obstruction during the Korean peace talks. Of the many local incidents which come within this category one need only mention a few. In Berlin, or on the East-West German frontier, an Allied soldier or vehicle has only to go by mistake a few yards over the border to incur detention, followed by long and tedious negotiations before being released. An allied airplane which flies in error over Soviet-controlled territory is treated as a hostile ‘plane on a war mission. Ordinary facilities for salving an allied aircraft or rescuing the crew, in the event of an accident or forced landing in Soviet Territory, or Soviet-controlled waters, have been refused. An outstanding example is the Soviet’s refusal to allow the Russian wives of British ex-Servicemen to join their husbands. This offered the Kremlin an excellent opportunity to demonstrate friendliness and goodwill had they wished to do so. The numbers involved were small, and the request could have been acceded to without the slightest inconvenience or loss of prestige.

#### ARMED THREATS

It can be said that the system of supporting argument by a display of force has been the normal procedure in international diplomacy since time immemorial. Indeed, among practical statesmen and diplomats it has been regarded as almost useless for one nation to press a serious claim against another without a show of strength.

Until recent times, however, this policy was usually kept within reasonable bounds. It was left to Hitler to show the world how whole countries could be subjugated by displaying overwhelming might in face of opponents bent on appeasement.

To-day we see the entire world in arms at a cost which seems as if it may delay post-war rehabilitation indefinitely and deprive mankind of many things which we have come to regard as almost necessities. The free world has been compelled to organise on a war footing and provide armaments on an unprecedented peace-time scale, in order to safeguard the continuation of its traditional institutions. It can hardly be doubted that without these measures Western Europe would, by now, have been engulfed by Communism, Asia be well on the way to sharing a similar fate, and America seriously threatened.

Along the East-West frontier of Europe aggression is kept in check by the knowledge that it would start a large-scale shooting war—with uncertain results and an unpredictable aftermath. Only in Asia, where hostilities can be conducted by proxy, and the fighting kept within limits, is there a shooting war.

To many these conditions point inescapably to a Third World War. They maintain that it is contrary to all previous experience for nations to

arm on a great scale and not succumb to the temptation to use the machine which they have brought into being. It cannot be denied that so long as these armaments remain the means exists to fight a great war, on a world-wide scale, at almost a moment's notice. It is not, however, certain that this will be the outcome. The condition has existed for eight years and, in spite of great provocation, there has been no major conflict. It may be that fear, and the knowledge of the unprecedented havoc that a full-scale atomic war would bring, will prevent it.

It is too early at present to predict the outcome of Marshal Stalin's death, but it seems unlikely that any noticeable change in Soviet *policy* (as distinct from *method*) will follow immediately. By the time this article appears in print it may be possible to form a better opinion on the future course of events.

There is one aspect of the present situation, in relation to modern weapons, which appears to have escaped notice. In 1944 the Germans used rockets (V2s) with a range of well over 100 miles, and we know that since the war projectors have been tested which can throw their missiles several hundred miles. The time is not very far distant when ranges of perhaps more than 1,000 miles will be attained. If such missiles carried an atomic charge their potentialities are not difficult to imagine. This is, however, only one aspect of the matter. It will also be clear that with weapons having these long ranges it might be very difficult to identify the user or establish the locality from which they were fired; as was, in some instances, the case with the German V1s and V2s in 1944. For purposes of argument we will assume that large detonations (atomic or otherwise) occurred in London, Paris, or even New York, in circumstances indicating that the missiles had been launched from a long-range projector of the rocket type. It would be possible for all to disclaim responsibility. Although we might guess their source we could not be absolutely certain. An accusation directed to the obvious quarter might bring the reply, "We know nothing. Perhaps if you enquire in Berne or Oslo they may be able to give you some information." Such missiles could be used by proxy—under the direction of the senior partner, but actually manipulated by, and launched from, the country of a satellite.

Summarised, we can say that the continuation of power politics on the present scale appears almost certain, and the employment of new, and novel, means of obtaining some dividend from the huge forces being maintained is to be expected. There is undoubtedly a danger of a Third World War of the shooting kind; but, in view of the stakes involved, and the uncertainty of the outcome, it appears unlikely. We cannot, however, expect any early agreement for mutual disarmament. It would seem that, at the best, the world must shoulder the burden of heavy armaments for many years to come.

#### LIMITED WAR AND WAR BY PROXY

If we accept the view that those in whose hands the decision to start another major war rests are restrained by the dangers of such a course, events in Asia become clear. Here is an area seething with discontent, where the Western nations strive to maintain a semblance of their old prestige, and in which the Soviet has friends who will fight on her behalf.

As a result we see limited wars in progress in Korea and Indo-China and guerilla operations in Malaya. These activities consume many fine Allied divisions, warplanes numbered in thousands, and a considerable fleet—without the participation of a single Russian fighting man, and the expenditure of very little Soviet equipment. Meanwhile the defences of Western Europe remain dangerously undermanned. From a purely military point of view the West could have hardly adopted a less favourable strategy. We can only hope that the political and economic advantages will eventually cancel out the military disadvantages.

A little thought and study will make it apparent that limited war and war by proxy, or a combination of both, need not be confined to the present areas. They have almost limitless possibilities if the time and place is selected with care and judgment. Hong Kong, various points on the Asiatic mainland, the East-West German frontier—these are some of the more obvious areas in which hostilities by non-Russians might pay the Soviet a good dividend.

We can hardly expect to see a diminution of these activities which have been, and still are, of such advantage to Soviet Russia. On the other hand it appears unlikely that there will be any serious extension of limited, or proxy, warfare until such time as the new regime in Russia has consolidated its position—a process which may take a considerable time.

The future is obviously obscure, but it seems likely that for some time to come the New Warfare will continue, more or less, in its present form.

#### HOW WILL IT END?

It is a mistake, although a very common one, to suppose that peace is the normal condition of mankind. The history of the world is mostly the story of man fighting man, in groups of ever-increasing size, and with weapons of ever-increasing power of destruction. Modern history gives no cause for belief that more peaceful conditions are likely in the near future. The idea that there could be universal, and permanent, peace is something quite new, and a theory which would have been considered impracticable before the twentieth century, although several earlier attempts have been made to maintain peace in Europe.

Our Divorce Courts, Local Government, and Parliamentary procedure demonstrate how difficult it is for comparatively small communities of the same race, speaking the same language and with a common interest, to see eye to eye. Is it likely that an assembly like U.N.O. will agree—representing, as it does, more than fifty nations; with opposing, rather than common, interests; speaking many languages and composed of delegates of widely different colours, creeds, origin, and outlook? The answer is that it would be remarkable, and contrary to all experience, if U.N.O. attained any considerable measure of agreement on any subject of importance.

We must accept the fact that Eastern Communism and Western democracy will remain stoutly opposed for many generations. The differences of outlook are too great, and too fundamental, for it to be otherwise. We can only hope that the apparent equality of the rival antagonists, the realisation of the terrible consequences for all, and a semblance of sense and goodwill, will prevent a full-scale shooting war.



Recently a school of thought has made its voice heard which advocates what is called "peaceful co-existence," meaning that the two ideologies of East and West should attempt to live side by side; not perhaps in friendship, but with a reasonable absence of discord and a measure of co-operation—on the principle of "Let us have our Democracy and you can have your Communism." This is a theme which is, at least, worth considering and would indeed appear to be the only method of solving present world problems without bloodshed and destruction on a great scale.

It is a comparatively simple matter to draw a line which divides the world into two camps very neatly, and on examination it will be found that both groups have a self-sufficient economy, with the good things of the world fairly evenly divided. It is possible, if an initial step was taken in this direction, that in time—perhaps a very long time—the two groups might draw closer together and a world in friendly rivalry emerge.

It cannot be pretended that such a course would be anything but very, very difficult. The major obstacles to such a solution appear to be: .

(a) *Russia's Missionary Tactics*

The Soviet would have to abandon the principle of "World Communism by any means", and, unpalatable as it might be, the Free World would have to give up all attempts at "knight-errantry"—the policy of saving and retrieving people threatened by or already under Soviet control, a policy which has been of doubtful service to those concerned, in cases such as Korea. The principle that each group is entitled to conduct its affairs in its own way, but must refrain from interference with the other, would be essential.

(b) *Present uncertainty in Russia*

We cannot tell what will result from Marshal Stalin's death. Outwardly the *status quo* will probably remain for many months; but the eventual outcome is unpredictable. Democratic government depends on a system which, in the most successful cases, is based on tradition and the characteristics of the people. Dictatorships are quite different. They depend for success on the personality, ruthlessness, and acumen of one man, or a small group of men, and in the case of Russia we are in the dark as to whether Marshal Stalin's successors possess the necessary qualities to maintain a constant policy, a stable government within Russia and control of her satellites.

This makes any approach to the Soviet by the leading Free World powers a matter for caution, and creates uncertainty as to whether any understanding would be implemented.

It is no easy manner to suggest a solution to these grave problems without the inside knowledge which is available only to those holding official positions at high level. We cannot suggest details of time and method: only principles and a general trend of action.

It is apparent that there can be no quick solution to our difficulties, which can be resolved only by a long and painful process. Moreover, the issues involved are so vital to our very existence, and the chances of an amicable agreement so uncertain, as to make any degree of unilateral disarmament unthinkable. The Free World is faced with the difficult task of attempting a peaceful settlement, and at the same time maintaining its

armed strength as a safeguard against failure. Even if we grant the Soviet her professed peaceful intentions—which are not by any means apparent—no doubt she views the problem in much the same way as we view it.

The following suggestions are offered as a possible long-term policy which might eventually bring about a better understanding between East and West, based on peaceful co-existence.

### *Stage I*

An early meeting at the highest level between representatives of America, Britain, and Russia—and possibly Communist China,\* with the main object of persuading the Soviet to renounce her missionary tactics and accept the principle of peaceful co-existence.

This will clearly be the most difficult, and critical, fence to surmount, and it may be some time before the Russian scene has become clarified sufficiently to permit such a meeting. It would seem, however, that Marshal Stalin's death creates an opportunity for a new approach which should not be missed.

### *Stage II*

Stage I to be followed by discussions, and examination, in every sphere and locality where dispute and tension exists between East and West. In major matters—such as the Korean War, relations between East and West Germany, etc.—discussion at a high level would be necessary. Less important matters could be dealt with on a local basis.

This stage would almost certainly be a very lengthy one, and complete success everywhere could not be expected.

### *Stage III*

As soon as Stage II attained a reasonable measure of success, what might be termed a period of tranquility, for the consolidation of better behaviour and relations, might start.

### *Stage IV*

Further approaches. These might take the form of a second meeting at the highest level. By this time, if all had gone reasonably well, an atmosphere might have been created in which useful discussions for mutual disarmament on a worth-while scale would be profitable.

This is as far as we can go. The proposals are based not on spectacular, or immediate, results brought about by some masterstroke of wizardry—which would be impracticable and certain to fail; but by a methodical and long-term process—interrupted no doubt by many frustrations and disappointments, but which might have some chance of success.

The aim is to produce, eventually, a world in which all men can live—not in complete agreement, which is impossible, but in reasonable security without fear of devastating war, and without the crushing economic burden of armaments on the present scale.

To the logical and fair-minded the principle of peaceful co-existence seems utterly reasonable, and it appears to be practicable. We should

\* There are obvious difficulties in including Communist China so long as she remains unrepresented in U.N.O. and her government is recognised by Britain, but not by the U.S.A.

strive hard, and if necessary long, to achieve success. If, however, we fail, or our good intentions are not reciprocated, what course is the Free World to follow?

The answer is clear :

(a) We must fight every aspect of the New Warfare with skill and determination.

(b) We must be ready to fight, and win quickly, a Third World War of the shooting kind if it is forced upon us.

(c) We must make clear that we are ready, at any time, to negotiate a settlement based on the principles outlined above.

The Free World must be prepared, and indeed strive, for a reasonable negotiated settlement; but there are certain principles on which Democracy must take its stand and about which there can be no compromise. To quote President Eisenhower's words in his inaugural address on January 20, 1953: "... for in the final choice a soldier's pack is not so heavy a burden as a prisoner's chains."

C. N. BARCLAY

Technical requirements make it necessary to write this article some months before publication, and it is probable that many developments will take place in the meantime. It is likely, however, that any changes which occur will be in matters of detail only and not in the fundamental principles which are the basis of the article.



*(Official Photograph)*

Active Service in Korean Waters. A.A. Gun in H.M.C.S. Athabaskan



## CHAPTER VI

### THE CONTEXT OF AMERICAN REARMAMENT

BY THE HON. ALASTAIR BUCHAN

BETWEEN THE withering of the leaves in 1952 and the opening of the first buds of 1953 occurred two events of profound contemporary significance—the election of General Dwight Eisenhower as the first Republican President of the United States in twenty years, and the death of Joseph Stalin, for twenty years undisputed ruler of the Soviet Union. It is still impossible to judge what the effect of the second of these two events will be; it may lead to a temporary lull in the cold war while the Russian leaders consolidate their internal position; it may lead to an intensification of the cold war.

No such mystery surrounds the advent of the Republicans to power, especially in the field of American military policy. Despite the fact that the 1952 Presidential election was one of the bitterest and most emotionally exhausting in living memory, the essentials of the rearmament programme as it has been developed over the past three years were never really called in question by either side. It is true that General Eisenhower did make one wild statement during the campaign to the effect that the military budget would be drastically reduced but he quickly withdrew from this exposed position, and on the whole the election debate centred much more around the possibility of getting better value out of the money spent on rearmament and of finding ways to end the Korean war, than round any supposition that the United States could drastically reduce the level of its armed forces or its arms production.

The crux of the current American political debate does however have an important bearing on the future of the American rearmament programme. The core of the Republican election programme was that the American budget which has been financed by a deficit in most of the post-war years must be balanced, and that taxation not only should but would be cut if they were returned to office. Since the portion of the American budget (including foreign military aid and offshore procurement) now attributable to defence accounts for some two-thirds of the whole, it is not surprising that the main attention of the Republicans once in office should be turned to defence expenditure and the extent to which it can be reduced without harming the essentials of the rearmament programme itself.

The American budget process—in particular the military budget—is so different from the British that it is worth a word of explanation, if only to comprehend the limitations which it imposes. The American financial—or fiscal year—runs from July 1st to June 30th. Under its various headings the Administration has to seek the authority of Congress, not only to spend public money for the current year, but also to lay aside funds for expenditure in future years when the particular project for which the money is intended will mature and the bill for payment be presented. The complexities of this process have been especially accentuated since



the outbreak of the Korean war by the fact that the United States has placed particular emphasis on its aircraft, tank, and heavy shipbuilding production programme, in which authority has to be given to manufacturers to undertake lengthy research and production projects although the fruits of these may not mature for several years.

This is a process which the foreign observer may be pardoned for misunderstanding since it is equally misunderstood by most Americans and a great many United States Senators. For instance, in the three years in which the Korean war has been going on, from mid-1950 to mid-1953, Congress has appropriated the gigantic sum of \$155,600 million to which will probably be added some further \$40,000 million for the current fiscal year. Of this sum, \$98 million had been specifically earmarked for procurement and construction, but only \$48 million worth of equipment and construction had been delivered by December 1952. The rest of the money is earmarked for production which will not mature for several years, and may not actually be paid out until 1957 or 1958. In fact, almost the only elements in the military budget which are expended as fast as they are voted are those for pay, movements, and other current services.

The American administration has undertaken to carry through a five or seven year rearmament programme on the basis of annual allotments of public money, which is the only way in which Congress (or any other democratic legislature which has the power of the purse) is prepared to vote them. It is because the military and civilian officials have been able to show only a partial return in terms of actual production for these vast allocations of public money in the first three years, that there has been such a constant ferment of irritation and criticism both in Congress and among the public.

The situation is now altering. As the first phase of the rearmament programme—the creation of production facilities for military equipment and tooling up the factories—becomes completed, and gives way to the second phase—actual production of aircraft and other equipment—the rate of delivery and expenditure is tending to rise while the demands for fresh allocation of funds begin to go down. The aircraft ordered by the United States Air Force in 1951 and 1952 will be largely delivered in 1953 and 1954. Thus in the first two fiscal years after the outbreak of the Korean war, the Department of Defence spent only \$58,800 million although Congress had allocated \$118,400 million. But for the current fiscal year—that is the twelve months from July 1st, 1953, the outgoing Democratic administration proposed to spend over \$46,000 million, excluding foreign aid, for one year, while the new money which Congress has been asked to vote is only \$41,200 million as against \$48,000 million for the last fiscal year and \$60,000 million for 1951–52.

The cost of the Korean war, which until this year has not been accounted for separately, has been roughly calculated at \$5,000 million a year. If there is an armistice in Korea it would not be possible to eliminate this cost as long as American troops and aircraft have to be stationed in Korea to help ensure that the armistice is observed. But it is thought possible that about two-fifths or half of this cost might be saved immediately through economies in ammunition, supplies, and movements.

The original American rearmament programme devised by General Marshall and Mr. Robert Lovett in 1950 envisaged a rapid build-up of

American and European military strength to a "peak" in 1954, after which expenditure and production could be levelled off to a high "plateau" of defence. The year 1954 was chosen as being the one in which Russian strength would be fully developed, and in which the temptation to Soviet aggression would be at its height. During the last eighteen months of the Truman administration a "stretch out" of this programme setting the peak at 1955 rather than 1954 was tacitly accepted. The creation of new production lines, and the breaking of industrial bottlenecks had delayed the original programme, and the drain of the Korean war on existing resources had prevented the building up of stocks. But the essence of the plan, the development of a peak of strength to meet a "critical year" remained unaltered, although there was never any question of full scale mobilisation, and General Marshall repeatedly emphasised that it was designed to give long term rather than immediate security.

President Eisenhower made it clear at the beginning of May that he did not accept the criterion of the "critical year" but was in favour of "steady continuous improvement" to meet a danger that might last for a lifetime.

This policy of ours, therefore, will not be tied to any magic, critical year which then has to be "stretched out" because of economic or production problems, but will be based on the sounder theory that a very real danger not only exists this year, but may continue to exist for years to come; that our strength, which is already very real, must now be made stronger, not by inefficient and expensive starts and stops, but by steady continuous improvement.

The President's remarks were closely parallel with the position taken by Mr. Dulles, the Secretary of State, at the N.A.T.O. meeting in Paris in April. There the American representatives made it clear that they accepted an equivalent realignment of policy in regard to the build-up of the N.A.T.O. forces in Europe; this in fact was an acceptance of an argument, first put forward nearly a year earlier by the British Government, that the growth of N.A.T.O.'s strength must be related to the economic capacity of the member countries, and must take account of long-term needs as much as immediate requirements.

President Eisenhower consequently decided to reduce the Truman administration's request for \$41,200 of new appropriations for American rearmament in 1953-54 by 5,000 million or to about \$36,500 million, and for foreign military economic from \$7,600 million to \$5,800 million, the principal reduction being in military aid to Europe.

Just how this reduction of about twelve per cent. in the year's budget will affect the shape of the American rearmament programme is not easy to determine. It does not logically mean that there will be a reduction in the current rate of expenditure on production, for the reasons that have been noted, although to balance the budget there are bound to be some reductions in current expenditure. The President, however, made it clear that the reduction in appropriations would not affect existing American and allied strength.

These savings will not reduce the effective military strength we will deliver to ourselves and our Allies during fiscal 1954. Deliveries actually will be speeded up through the reduction of lead time, and concentration on producing those items which make the most military sense for the immediate future.

However, it has been generally assumed that the President's action will have three effects. In the first place, it will prolong the "stretch out" of the development of maximum American strength from say 1955 to say 1957 or 1958, by slowing down the production rate of aircraft and other major equipment so that a plateau will be reached, as it were from below, rather than by descent from a peak.

In the second place certain production plans and force goals will be modified. It is expected that the Navy's plan for the laying-down of a third "super-carrier" will be turned down. The original plan for the expansion of the United States Air Force called for an eventual strength of 143 wings (the equivalent of an R.A.F. group). This has now been reduced to an eventual total of 120 wings, the interim goal for June 1954 being 114 wings. Finally, it is probable that the budget cuts are based on hopes of reducing the total mobilised American manpower from its present figure of three and a half million men and women, whether there is a truce in Korea or not.

There has been considerable discussion recently about the advantages of narrowing the American mobilisation base in the interests of getting a better defence production programme at less cost. Under the present system most of the major aircraft and weapon contracts are divided between one or two major companies specialising in such work and one or more firms who have been specially equipped for the purpose. For instance, a contract for the production of medium tanks may be divided between the U.S. arsenal at Detroit, a motor car firm, and an agricultural implement firm, all of them working at about half or quarter capacity on tank production. The purpose has been to create the production lines and train the skilled workers, so that if total war suddenly became imminent production could be doubled or quadrupled overnight. This programme is undoubtedly costly and Mr. Wilson, the new Secretary of Defence, is thought to have been in favour of concentrating production by concentrating on the most efficient producer, whose production line would then be working at full capacity, with all the advantages of mass production. But although such a shift may take place over a number of years, it will not be sudden or be made in such a way as to dislocate industry.

The man-power goals outlined by the Democratic Administration called for a small increase in the size of the Air Force and the Marine Corps, and a small decrease in the size of the Army. By the middle of 1954 it was calculated that the strength of the United States Army would be 1,538,000, the U.S. Navy 800,000, the U.S. Air Force 1,061,000 and the Marine Corps 248,000, giving a total of 3,647,000 men and women in uniform. The Army, owing to more efficient use of manpower, is now in a position to add one more division to existing twenty divisions and eighteen regimental combat teams (the equivalent of a British brigade group), although this expansion will not be authorized for the time being. There would be no increase in the present three Marine divisions and three Marine Air Wings.

At the time of writing Mr. Wilson had not yet clarified his man-power policy, but feels that these goals are too high, and that American security will not be endangered by a reduction in the mobilised man-power of both the Army and the Air Force.

The American armed forces still have a very high turnover of man-

power, owing to the fact that selective service is for two years only. In the two and a half years between the middle of 1950 and the end of 1952, over three and a half million men entered the forces and over a million and a half left them. Most young men volunteer rather than wait to be drafted, as this gives them an opportunity to start their two year service before the age of eighteen and a half, and also enables them to choose their service. But the Army still has to use the power of the Selective Service Act to get about a quarter of a million of its replacements each year, which means a shrinking in the size of the general man-power pool. It is very unlikely that Congress or public opinion would ever acquiesce in a longer period of "inducted" (i.e. conscripted) service than two years. But if there is an effective armistice in Korea it would be possible to keep troops there for longer than the nine months in a front line unit and twelve to sixteen months in a support unit which is the present average length of service there. Consequently the Army's general man-power position would be considerably eased.

Congress has not yet decided to enact Universal Military Service, which would enforce a period of training for all able-bodied young men. Despite President Eisenhower's known support for this system it is doubtful if he will make an issue of the matter in the near future. Although many people consider it a fairer system than the present mixture of volunteers and "draftees", it is vigorously opposed by a number of schools and education authorities. In the meantime the reserve system has been reorganised. All men entering the armed services now have an eight years obligation, of which five years are spent on active duty and in the Ready Reserve, and three years in the Standby Reserve. The former can be called out by the President in time of emergency, the latter only by Congress and in time of war.

When General Eisenhower became President he appointed, as was to be expected, an entirely new team of civilian heads in the United States Department of Defence. Mr. Charles E. Wilson, the President of General Motors Corporation, became the Secretary of Defence, and one of his right-hand men at General Motors, Mr. Roger M. Kyes, became Under Secretary. Mr. Robert F. Stevens, a New York banker, became Secretary of the Army; Mr. Harold E. Talbott, a New York business man, became Secretary of the Air Force, and Mr. Robert B. Anderson, the head of one of the Texas oil companies, became the Secretary of the Navy.

It was inevitable that a new team at the Pentagon—especially with a famous and deeply-experienced general in the White House—would re-examine very carefully all the assumptions on which current American policy is based, more particularly since the new men are drawn from the ranks of American business and came to office determined to make the military machine conform more closely to the efficient standards of American industry. So far the re-examination has taken the form of question marks rather than firm decisions, but it is likely that there will be changes of emphasis in the structure of each of the three Services. For instance, in the Army, the whole range of problems raised by the reality of the tactical atomic bomb is being very closely studied. There is a growing body of opinion within the Service that feels that the development of armoured forces has received too little emphasis in recent years. It is also being questioned whether the seven half-strength divisions which

are maintained for training purposes in the United States really serve an effective purpose. In the Air Force, considerable debate has been aroused by the Administration's decision to lower the goal from 143 to 120 wings. Mr. Wilson has asserted that this will make a negligible difference to American strategic strength, and will mean that the existing force, which is now something over 100 wings, and will be expanded to 114 by the middle of next year, will be better equipped. This appraisal has been bitterly criticised by General Hoyt Vandenberg, the outgoing Chief of Staff of the Air Force. President Eisenhower, however, has made it clear that he will stand by Mr. Wilson's decision and it is probable that Congress will accept it.

The President has already taken action to simplify the organisation of the Defence Department and strengthen civilian control. In a reorganisation plan published in May he made certain amendments to the Department's structure which will have the effect of making the Service chiefs directly responsible to the civilian secretaries, while at the same time increasing the power of the chairman of the Joint Chiefs of Staff over his colleagues. Although these amendments are not radical, it is generally thought that they will help considerably in preventing the inter-service feuds, notably between the Air Force and the Navy, which have so often embittered discussions of American strategic policy.

ALASTAIR BUCHAN

## CHAPTER VII

### FACTORS IN SOVIET POLICY

By JULES MENKEN

NEVER HAS the world situation been more obscure than in the late spring of 1953, when this chapter had to be written. The death of Stalin and the inauguration of the Eisenhower Administration introduced fresh major uncertainties where all was more than uncertain enough before. The initial moves of the new Soviet regime made the surrounding gloom even thicker and more inspissated. Did the Kremlin now desire peace, as most of the world hoped and longed to learn? Or were its acts merely clever tactical steps in the old sombre *pavanne* of Communist ambition and lust for power? No riddles more deeply perplexing—or fraught with a weightier burden of life and death—have ever confronted mankind.

In this situation the critical questions were—and are—four: Who are the men? What are their purposes? What is their power? What is their strategy? For convenience these questions may be considered one by one; but they are not separate in fact, and indeed each of them conditions, and is conditioned by, the others.

#### WHO ARE THE MEN?

This question means who are the individuals who hold power in the Kremlin, and how is power actually distributed among them? At the time of writing neither answer was known. This is not surprising. In the political firmament, Stalins—that is, men whose power is as absolute and unchallenged as the great dictator's in his later years—are fortunately rare. In all societies the struggle for power is inherent and practically continuous, and the exact location of effective power is often obscure. In the Soviet Union, moreover, the deliberate concealment and distortion of knowledge freely available elsewhere are among the major means used for years to conceal and further the purposes of world Communism.

What was known at the time of writing made certain tentative opinions not improbable. It is clear that no one inherited—or could inherit—Stalin's position and power, let alone his prestige. As an American writer points out in an informative study (Martin Ebon, *Malenkov: Stalin's Successor*. McGraw-Hill, New York and London, 1953), Malenkov, although titular head of the Soviet Government, did not become a dictator, but a member of a junta or directorate in which he "stands out by virtue of drive, toughness, and the sense of inborn personal power which emanates from him—but is held in check by others." It could be doubted whether Beria would ever be a serious candidate for supreme power, since Great Russian pride was most unlikely ever to allow another Georgian to succeed Stalin—as Beria himself must have realised. Moreover, a successful police chief needs qualities different from those of a man ambitious to rise to the highest position and capable of getting there; there is no evidence that Beria has developed the breadth which supreme responsibility would require; and he would seem to have



aged too much to embark at this stage on a life-and-death struggle. In the case of Molotov many factors appeared adverse: age, doubtful health, obvious lack of Stalin's favour for the succession, isolation at the Foreign Ministry from the sources of effective domestic power. On the other hand, at a critical juncture Molotov's support or opposition might prove decisive for others. Even more obscure were the prospects of other ambitious aspirants at or near the top of the Soviet governing hierarchy. Outside Russia the names and abilities of such men could not even be guessed at (one or two probable cases apart); while as far from the outsider's ken were the likelihood and probable direction of splits, alliances, and re-alliances within the great Soviet power-centres—police, Party, army—which would bring yet other individuals towards the top, and produce further constellations and combinations of power.

Although definiteness about names is unwise or impossible, a good deal is known about the types who are certain to rule. In the foreseeable future they will be energetic, determined, ruthless men; ambitious both personally and for the Soviet and Communist cause with which they are identified; steeped through and through in the pernicious Communist view of society and life, though not necessarily doctrinaire as individuals for that reason; men who do not know the true meaning of live and let live, and whom only fear of failure or of disaster would lead to prefer peace to domination.

#### WHAT ARE THEIR PURPOSES?

One of the hallmarks of Stalin's genius was his concentration upon the maintenance and increase of his own power, and upon the expansion of the Communist power-system of which the Soviet Union, the Kremlin, and he himself were the several centres. If similar single-mindedness should characterise Stalin's successors, then the future of Communist policy will depend on the power which the Communist leaders command and the strategy they follow—as well, of course, as on the strength, cohesion, and policy of the non-Communist world. But if Stalin's successors are not as single-minded as he, different forces will come into play.

Political singleness of mind depends largely on whether power is concentrated and secure, or whether a struggle for it is in progress. Where power is divided, situations exist more or less like that in a world of sovereign or quasi-sovereign states. In such political constellations one condition of equilibrium is true independence of power-units, each capable of resisting absorption or inflicting hurt on others. Sovereign states possess these characteristics—which is one reason why constellations of such states are usually long-lived. But power-units (such as groups of individuals) inside an organisation are rarely capable of true independence, or even of long-sustained resistance. Ways and means of undermining or destroying such units or groups can usually be found which do not inflict too much damage on the larger whole. A violent and prolonged upheaval like the Soviet Great Purge (1936–1938) is one of the exceptions which on the whole prove the rule. The inability of internal groups in general to hold out for long or to inflict grave injury is especially characteristic of modern states, where the technical instruments

of power—communications, means of transport, weapons—give advantages to those in possession which their opponents can seldom counter.

Until the problem is solved and the lines of authority are settled, a struggle for power must be expected inside the Soviet Union. The prime purpose of the contestants will be to increase their own power and that of their friends. It by no means follows that major war is impossible while such a struggle is in progress, for war might provide—or be thought to provide—a desperate means to the domestic victory of one side. War is, however, improbable during such a struggle, for in the circumstances contemplated energies will be focused on internal and personal problems.

How is a Soviet internal struggle likely to shape? Personalities apart, there would appear to be three main groups of factors. The first comprises the social structure of the regime. The Soviet state rests upon security troops and secret police, upon administration and industry, and upon the armed services (especially the army) and the peasantry. The security troops, secret police, and others in the organisation headed by Beria comprise a full-time force which Mr. Ebon estimates (*op. cit.*, p. 79) at "about 1,700,000, an increase of nearly half a million over pre-war strength." This total includes frontier forces estimated as some 650,000; a militia some 350,000 strong independent of the army and comprising formations (including infantry, light artillery, and tanks) kept ready against internal disturbances; and a very large residue whose functions include manning regional command posts, administration, and the organisation and guarding of forced labour camps whose inmates cannot number fewer than 3–5 million and may total some 15 million. The Soviet Army numbers about three million, and is about twice as large as the Soviet Navy and Air Force together; in all three services both the secret police and the Party maintain special sections, which have often been at loggerheads with the professional officers, and whose primary loyalty must be to their own organisation and chiefs. In administration and industry the active and key personnel number perhaps some 3 to 5 millions; they include the politically important and numerically large group of administrators and other representatives of Party and State in collective farms and elsewhere among the peasantry. These administrative and industrial groups active in State administration, in industry, and on the land provide a very large proportion of the members of the Communist Party. Taking the Soviet Union as a whole, these several groups represent internal security, armed strength, production, and ideology or dogma—which is important not only internally as one of the forces sustaining the regime, but also externally as a principal means whereby the Soviets aspire to world conquest. Between the organised groups focusing these several interests, deep-seated tension and rivalries exist; and no struggle for power at the top can proceed without increasing them.

A second group of factors arises from differences about Soviet policy. The memoranda which Stalin published in *Bolshevik* last autumn just before the Nineteenth Congress of the Soviet Communist Party (and which were later translated under the title *Economic Problems of Socialism in the U.S.S.R.*) make it clear that a ferment had for some time existed which was deep and strong enough to cause the ageing dictator anxiety.

The issues included the pace and direction of Soviet policy. Should the Soviet Union continue to go all out for world Communism—and therefore for the heavy industry and armaments which the achievement of world Communism required—or should the pace be slackened somewhat and at least some of the resources now devoted to armaments and armament industries be applied instead to the production of more—and badly needed—consumer goods? One school seems to have held that the achievements of Soviet technique ought to have made it possible for the masses to have butter as well as for the state to have guns (and atomic bombs). Others were apparently ready to postpone further Communist advances throughout the world, spend less on guns and the atom, and have more for butter. The issue was not—and is not—simply between those who want more guns and those who want more butter. In addition, there are those who believe that Muscovite might is the real key to a Communist world, and those who hold that more could (and should) be done by non-Soviet Communists to help forward what from this standpoint may be called their “liberation” into Communism. Still other great questions also arise concerning the loyalty of the masses to the Soviet regime and the relative roles of oppression and inducement; the value, for example, of giving the people—especially the peasants—a stake in the country so that, if it came to war, they should not again surrender *en masse* as in the early months after the German invasion in 1941. Stalin, as might be expected, dealt faithfully according to his lights with all such heretical suggestions. But it was beyond even his power to remove the deep impulses and desires from which they sprang; and there can be no question that in the present struggle for power those who cry, “Forward!” and those who cry, “Enough!” will again confront each other.

The third set of factors arise from Soviet relations with China—including Malenkov's personal relations with Mao Tse-tung. Between Moscow and Peking there may at present be a broad identity of aims, and a corresponding division of functions; but agreement over a longer period is by no means assured. Ought the Kremlin to help China to develop into a strong military power equipped with modern arms and with the industrial capacity to produce some or all of them? How much Soviet aid should be given for this purpose, and at what cost to the Soviets? What ought the Chinese to pay for what they get? What guarantees can the Russians have against the ultimate ambitions of the Chinese? These and many related questions are bound to arise in the process of sorting out purposes and priorities between Moscow and Peking—and are also bound to affect the course of the Soviet internal struggle for power.

Looking at the situation from outside, three suggestions may be made. The first is that, for a time (which may be comparatively long), a good many apparent inconsistencies and contradictions in Soviet policy are possible, not to say probable. Such developments, whether agreeable or disagreeable to the West, are likely to reflect more or less short-lived changes in the Soviet internal balance of power, or tactical moves by one or other party to the struggle. The second suggestion is that, in an age (like the present) of moral unrestraint and intellectual and physical violence, a kind of Gresham's law of politics is likely to operate; so that we must expect Soviet expansionist tendencies and the self-assertiveness, particularly of the Great Russian section of the Soviet population, in the

long run to overbear contrary influences which might tend to relax existing international tensions and to reduce the excessive burdens which armament for world conquest places on the Soviet (and satellite and Chinese) peoples. The third suggestion is that, as the internal conflict is resolved, consistency, firmness, and perhaps even speed of action are likely to appear in Soviet policy after a period in which they have been absent; the emergence of these qualities (if and when they come) would then be a danger-signal which the West would disregard at its peril.

#### WHAT IS THEIR POWER?

Without attempting a systematic review, half-a-dozen points important to the West may be noted.

(a) *Soviet atomic effort* must be very large indeed. In his report to the Nineteenth Party Congress in October 1952, Malenkov stated that "State expenditure on the development of science amounted to 47,200 million roubles in 1946-51"—a period, that is, of six years. No interpretation of this immense outlay appears reasonable which does not attribute a large part to atomic activities. Other very large sums must also have been spent on the atom in undisclosed ways. The outcome of all this effort is not known; but it is clearly the official view at least in the United States that Soviet atomic advances have been swift and far-reaching, and that the Soviet stock-pile of atomic bombs is already a serious threat to the West, and in a short time (as little, perhaps, as a year or two) will be a grave one.

(b) *The Soviet Air Force*, with at least 20,000 aircraft in combat units and reserve, is considerably larger than the combined air forces of the N.A.T.O. countries, of which the Royal Air Force and the United States Air Force are by far the largest. The Soviet Air Force comprises three main types of formation—a long-range bomber force, a home defence force, and a tactical air force organised in the main to provide close support to the ground forces. There is also a Soviet naval air arm, which, however, lacks carriers and is land-based. The long-range bomber force is now equipped with Tu-4's (the Russian designer Tupelov's modification of the American B-29) whose range of about 4,000 miles is too short to bomb major American targets and return to Soviet bases. Such planes could, however, carry out one-way atomic attacks—though only at heavy cost in trained crews and expensive aircraft. The Soviet home defence force is equipped with almost 3,000 aircraft, for the most part MIG-15's; the European satellites are also being equipped with jet fighters, though the flight of two Polish MIG-15 pilots to the West during the first few months of 1953 must raise doubts about their reliability. The Soviet tactical air force comprises about 12,000 fighters (more than half of them jets), and is being equipped with a light jet bomber already in quantity production. The air experience of the Korean war, though limited, is significant; it is favourable to the West so far as quality goes, but it leaves unanswered the question which the Battle of Britain came near to answering adversely—the degree to which sheer quantity in sufficient mass can beat down a qualitatively better force whose numbers are too weak. The upshot at present would seem to be that Soviet bombers can strike any European or Japanese targets they choose, but

with the equipment now known are unable to launch more than *kamikaze* (or suicide) attacks on major United States targets; that the Soviet tactical air force will prove very formidable both in attack and in defence; and that the existing Soviet home defence force is today incapable of warding off long-range strategic bombing by the West, though a sufficient (and sufficiently swift) development of guided missiles might enable it to do so.

(c) *The Soviet Navy*, although it has more than 350 submarines—a force, even allowing for differences in types and training, which is substantially stronger than Hitler's at the beginning of the Second World War—and more ships in commission in the spring of 1953 than the Royal Navy, is nevertheless not strong enough to dispute command of the sea with the N.A.T.O. powers. Its purposes appear to be: (1) To guard as specially sensitive areas the Baltic and Black Seas, the Sea of Okhotsk, and the Sea of Japan (the last is strategically important to the Chinese Communist armaments base in Manchuria, as well as in relation to the whole complex of Soviet military strength in the Far East based on Vladivostok); (ii) To block a British and American approach to Europe, and to attack cross-Atlantic and cross-Channel supply lines; (iii) If possible to starve out the British Isles by mines and submarine attack along the sea approaches, and with appropriate technical modifications to deal similarly with Japan. The second of these purposes would imply a Soviet intention to occupy Western Europe with ground forces, rather than to destroy it by atom-bombing. In dealing with Britain and Japan, atomic and air-borne attack could dovetail with naval action; indeed, in so far as, say, atomic attack rendered certain ports unusable, the Soviet naval task in closing others might be eased. Whatever means might be necessary, to knock Britain and Japan out of any future major war would be prime objects of Soviet strategy.

(d) *Soviet trained man-power* is increasing faster than British and American trained man-power; the Soviet, satellite, and Chinese Communist increase combined is much larger than the corresponding increase in N.A.T.O. countries. This dangerous situation has many causes. The size of annual age-groups, the proportions taken for military service, the length of such service and the period during which men serve in the reserve are among the main factors. In Britain the broad position is that males coming up for national service now number about 300,000, of whom rather fewer than 250,000 represent the new intake from civil life; wastage of various kinds reduces the annual increase in the reserve to something under 200,000. In the United States the picture is blurred by the provisions of the Universal Military Training and Service Act of 1951; the heart of the matter is that, on past experience, the American armed forces will shortly be receiving for training somewhat fewer than a million youths annually, while the low age-ceiling of 26, by causing a large outflow at an early age, will reduce the annual increase in the American reserve of trained and available military man-power to rather under half-a-million a year. On the other hand, in the Soviet Union, where the reserve liability extends to the age of 50, reserves are increasing by between 800,000 and 900,000 a year (or more than the corresponding British and American increases taken together); while the annual increase in the trained reserves of the European satellites may be estimated at about half these numbers. The increase in trained Chinese man-power cannot be

calculated; the totals available for training are obviously very large, while the numbers taken must depend on costs of maintenance (which are low per man), the supply of arms, and Chinese Communist military plans for the future. It is true that this strictly statistical comparison somewhat falsifies the military picture, and that allowance must be made for broad training and fighting ability with varied modern weapons on the Western side as compared with the much narrower training and frequent resort to sheer numbers on the Communist side. Nevertheless, the overall trained man-power situation is highly unfavourable to the West; and with existing plans not even the admission of German man-power under a ratified E.D.C. treaty or the recruitment of Japanese man-power in circumstances not yet envisaged would restore the present gravely adverse balance. Before that can be done a revolution in ideas will be necessary, not least in France and the United States.

(e) *Soviet economic development* presents a number of disturbing features. The whole direction of the great economic drive of the last three years (1953–55) of the Fifth Five-Year Plan is towards yet further increase in military strength. Although in 1952 and 1953 ample steel was available for all the tanks, guns, mortars, shells, mortar-bombs, aircraft-bombs, and submarines that the Soviet armed force could require, further large increases in pig iron and steel capacity are planned and in progress. More significant are the plans affecting aircraft production. In aluminium, the basic material, the *increase* planned for the five years 1951 to 1955 inclusive slightly exceeded one-half the *total* United States output in 1951—and in the Soviet Union civilian uses do not drain aluminium from the military field as in the United States. The planned increase of more than 350,000 metric tons would provide enough aluminium to make more than 40,000 MIG-15 fighters and more than 7,000 medium bombers. Expansion in other places fits in with plans of this character. For example, the great planned increase in electricity output under the much-advertised projects for “changing the face of nature” would provide the current required for increased aluminium production. As significant in the view of some observers is the planned eight-fold increase in heavy forging-presses, which are used to make in a single operation—and at an immense saving in man-power, machine-tools, skill, and time—objects like the large landing-spars used in big bombers or the heavy fly-wheels of jet-engines. As Mr. D. B. Shimkin has pointed out, the shortage of special metals such as cobalt, molybdenum, and tungsten, though testifying incidentally to a lack of materials, reflects strikingly the demands of the Soviet jet-engine programme. Although there are weaknesses in the Fifth Five-Year Plan—in particular, the planned increase in labour productivity would appear to go far beyond the possible—the conclusion is not easily evaded that this Plan will leave the Soviet Union with a military base for modern war even broader and stronger than she possesses today.

#### WHAT IS THEIR STRATEGY?

“Strategy,” wrote Stalin in his lectures on *The Foundations of Leninism*, “is the determination of the direction of the main blow . . . at a given stage . . . , the elaboration of a corresponding plan for the disposition of . . . forces . . . , the fight to carry out this plan throughout the given stage . . .”



It is true that Stalin, thinking then (and generally) in terms of revolution from below, refers in the words and phrases omitted here to "the proletariat", "the revolution", and "revolutionary forces"; but this idiosyncrasy does not qualify the truth or lessen the relevance of his main thought, which is faithfully reproduced in the quotation above, and which implies both "cold" war and "hot" war, the use of political as well as military weapons. Nor is it mere pedantry to hold that this phase of Stalin's thought, which contains vital and fruitful truth, has impressed itself deeply on his successors, and within the measure of their own power and skill will affect their policy and action. There can be no doubt that "the direction of the main blow" ought at this stage to be destruction of the power of the United States. From the standpoint of the Communist leaders, whether in Moscow or in Peking, all other aims are secondary.

But how is the power of the United States to be destroyed! What, to use Stalin's words, is the "corresponding plan for the disposition of . . . forces"? Here, we may be sure, profound differences exist both in Moscow and in Peking, and also between the American and the Chinese capitals.

Whatever methods, political or military, are used, the problem may be stated thus: What are the objectives in order of *importance*? What are the objectives in order of *priority*? Ought armed force to be used in the shape of major war; and if so, at what stage? What choices, or combination of choices, would most advantage Moscow, and what choices, or combination of choices, would most advantage Peking?

In order of importance (which it is very difficult—and not altogether necessary—to distinguish from priority in time), the main objectives would appear to be somewhat as follows: to divide Britain—and also France—which from the United States; to remove from American control bases from atomic attacks against major Soviet targets can be launched; to bring a united Germany within the Soviet orbit, or at the very least to neutralise it; to bring Scandinavia and the Mediterranean under Soviet control; to bring Europe west of the Rhine under Soviet control; to paralyse or overpower Britain; to bring Japan under Soviet (or Chinese Communist?) control, or at least to neutralise it, and as a preliminary to secure all Korea; to complete the conquest of Indo-China; to make good progress with the establishment of Communist bases in India (broadly after the Chinese and Indo-Chinese patterns); to deprive the West of Middle Eastern oil. To the extent that these objectives can be achieved, the world balance of power will be altered and the United States will be isolated.

It is obviously impossible to rearrange the entire dozen or so of these major objectives in a hard-and-fast order of priority, and any attempt to do so would be rightly suspect; but it is perhaps not unreasonable to pick five items which between them must have very high priority indeed. These are: to divide Britain, France, and the United States; to absorb or neutralise Germany; to bring Scandinavia under Soviet control; to obtain a controlling strategic grip on Indo-China (which is quite compatible with leaving parts of the country in French and Vietnamese hands for the time being); to work toward bringing Japan under Communist control, and with this object to get a grip on the whole of Korea.

Few questions have been more widely or more fiercely debated than whether the Soviets will resort to armed force in the shape of major war. The essence of any true answer would seem to be, not if war is unnecessary, and not if there is any real risk of Soviet defeat. But we can go further than this. Two more questions are crucial: (1) Is it conceivable that the Soviet Union could dominate a United States which had been Communised by peaceful means, but which otherwise retained all the drive, energy, and organising powers that characterise the American people. (2) Can the American threat to a Communist world be finally removed unless and until the American people bleed themselves to death against a Communised Eurasian continent, or unless the United States itself is crushed with the new powers which atomic and hydrogen bombs place in a Soviet aggressor's hands? Unless the answer to *both* these questions is affirmative, the only check on Soviet willingness to resort to major war will be the fear and risk of defeat. And it is plainly to remove that risk that the gigantic Soviet arms programme under the present Five-Year Plan is being driven forward.

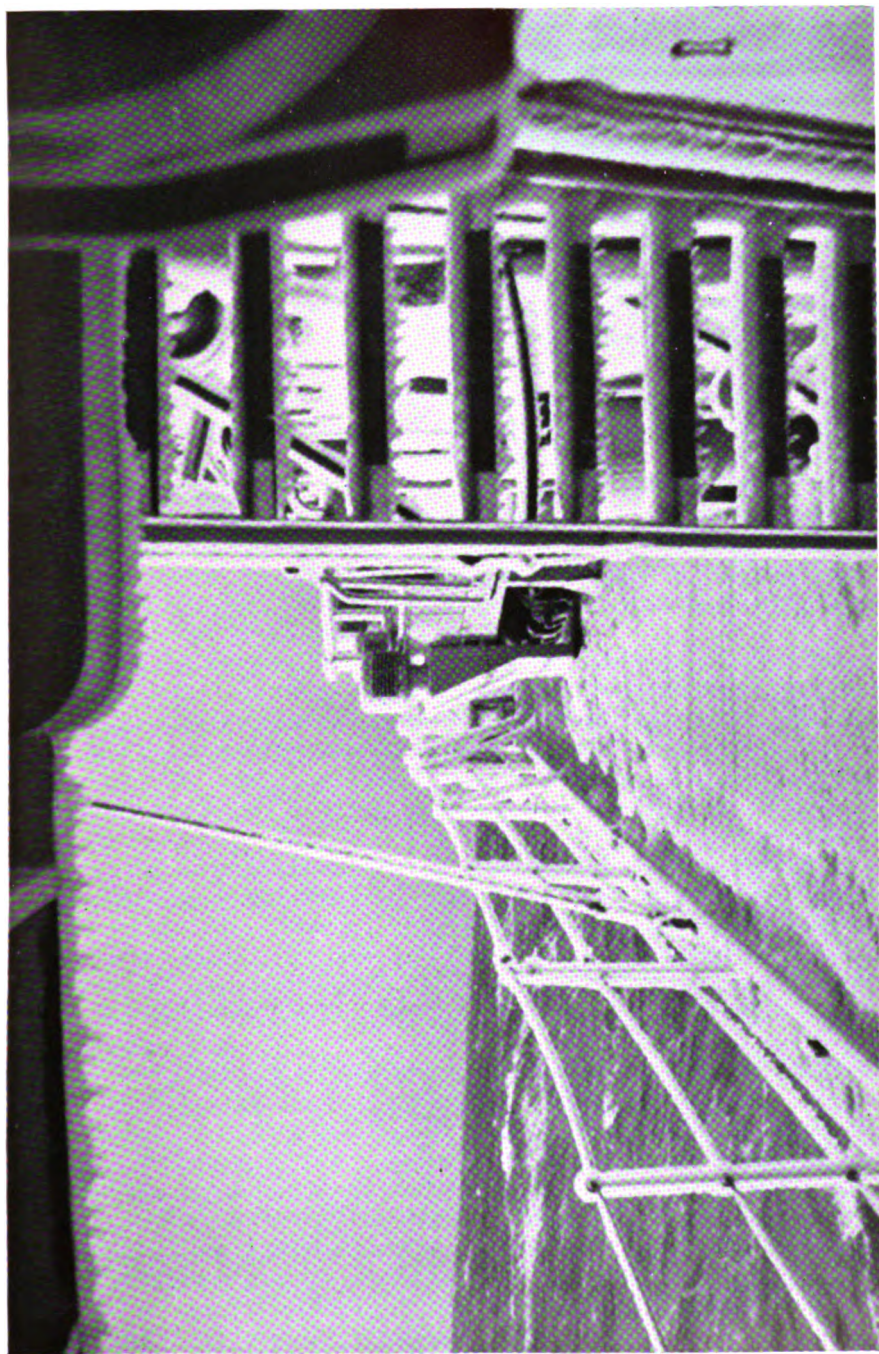
The last question formulated above—how policy can be framed with greater advantage to Moscow and Peking respectively—would lead too far afield, and will not be considered here.

Situations which develop simultaneously on widely different levels of thought, feeling, and purpose are exceptionally bewildering. After the death of Stalin there were many reasons why Moscow should welcome a tactical *détente*. Time is needed for any internal struggle to work itself out, and for the real successor to Stalin to seat himself firmly and get a strong grip on the levers of power. Not least important among the attributes to which he must lay claim is the aura of legend whose power—whether radiant, or effulgent, or sheerly terrifying—has from time immemorial constituted the better half of the secret of rule over the masses of mankind. In that legend the brightest jewel is reputation as a man of peace. Time is also needed to bring Stalin's successor that aura of legend, and to place the jewel of reputation for peace in its crown. Time is needed as well to see whether, in the new political atmosphere which the Eisenhower regime represents, the Western peoples will fall out among themselves. Time (and smooth-tongued words) are needed to help them to do so, as Stalin, one of the supreme masters of the art of divide and rule, advised in his last published major pronouncement. Time backed by hard work will also serve to increase Soviet and satellite and Chinese Communist armed strength, not least in the vital atomic weapons, and will bring the Soviets relative gains as well if the Western powers slacken their effort as they are surely tempted to do.

For all these reasons a long *détente* can serve Moscow's purpose well. Whether it can be as useful—or even useful at all—to the West is quite another matter. It is not a question of whether we should do business with Moscow, but whether we should relax our guard. It is always possible that the Soviets may make proposals which in themselves the West would find advantageous. Such proposals might be more dangerous than an offer whose hypocrisy was clear. An attractive offer—one genuinely to the West's advantage, and perhaps even involving some little cost to the Soviets—might be merely a bait. Moscow might well be willing to pay a not inconsiderable price in the belief that, once the West

had relaxed, it would be incapable of rising again to sustained and disciplined effort. The more superficially attractive a Soviet offer, the more thorough and critical an examination it must therefore receive. Nor should it be forgotten that in democratic polities popular education must always precede effort—and that painful experience must usually precede education. What is essential above all is that the leaders of the West should not deceive themselves about Moscow's real and permanent purposes, or about the immense and sustained effort and sacrifice by which alone freedom and Western civilisation can be preserved.

JULES MENKEN



Active Service in Korean Waters. Upper deck of H.M.A.S. Condamine, Frigate of the Royal Australian Navy  
(Official Photograph)



## CHAPTER VIII

### CIVIL DEFENCE

BY SIR JOHN HODSOLL

IT IS perhaps not generally realised that on April 1, 1953, it will be 18 years since Civil Defence was first launched publicly in Great Britain. It was in 1935 that, as a part of the re-armament programme, it was decided that Civil Defence, or Air Raid Precautions as it was then called, was going to be an essential part of Home Defence in any future war and preparations must be put in hand.

As a matter of historical fact a Sub-Committee of the Committee of Imperial Defence was actually first set up in 1924 to consider these matters, and a second Sub-Committee was added in 1929. In addition considerable preparatory work was carried out in secret between 1924 and 1935.

Because of the thought which had been given to the problems beforehand, and the physical and organisational action which had been taken, Civil Defence was able to go into action reasonably well prepared. It emerged from the war with few changes in its original conception, none of them being of a fundamental character.

After the war the Service was disbanded, most of its equipment dispersed, and the physical precautions pulled down and dismantled, so that when the time came to set it up again it had virtually to start from scratch. It had been possible however to hold a certain number of the personnel together by means of clubs, associations, and social activities of various kinds, and in many cases this was a help when recruiting was opened.

So far as practical experience is concerned, Britain and Malta each shared a good deal, that of Britain being more varied since it included rockets and flying bombs. Furthermore Malta, fortunately, had little or no fire problem. Of the enemy Germany and Japan suffered far heavier bombing; Japan particularly being at the receiving end of the only two atomic bombs dropped in the war and also the most heavily concentrated incendiary raid.

A very careful study has been made of all the lessons experienced and the results subjected to a most careful scientific analysis. Particular attention was paid to the phenomenon known as "the fire storm" which was experienced in four German cities, notably Hamburg, and in the Japanese city of Hiroshima as a result of the first atomic bomb. It has been possible to apply this scientific data to the cities of Britain and so enable our Civil Defence preparations to start off on a far more factual basis than was possible in 1935. Consequently it has been possible to help the authorities to make a more realistic appreciation of the situation that might confront them in the future.

It is generally accepted now that no country can risk going to war against another possessing a strong Air Force and all types of modern weapons, especially the atomic bomb, unless it has provided itself with a Civil Defence organisation. Since the range, speed, and weight carrying capacity of aircraft has increased so greatly, it follows also than many countries



that were immune from attack in the last war could now receive the full weight of an enemy's air onslaught.

Civil Defence has, therefore, become a vital and essential part of the re-armament programmes of the majority of countries belonging to the North Atlantic Treaty Organisation. The strength and ability of that organisation to wage war successfully must depend to an increasing extent on the ability of the countries concerned to protect their bases and sources of production, and above all the morale of the population, since in a democracy, at any rate, if the will of the people to continue the struggle is broken, the war is lost.

It must be appreciated that Civil Defence can only hope to succeed in its task if the scale of the enemy's attack is kept within reasonable bounds. Once control of the air is lost then sooner or later it must be overwhelmed, and the importance of breaking up any all out attempt to achieve early victory with atomic weapons needs no emphasis.

In an island country such as Britain, dependent as she is on so many supplies from overseas, it is necessary to take many precautions from a Home Defence point of view, e.g., stockpiling of food, the planning of a system of rationing, and so on. Such measures are not strictly Civil Defence. In fact Civil Defence is really a part of these wider measures on which the safety of the country and its ability to continue the war depend to a considerable extent. Similarly, after raids, there are big problems of restoration, many of which have little or no connection with Civil Defence. In this article these matters will not be dealt with, except perhaps in passing, and Civil Defence will be considered in its narrow and perhaps more legitimate field.

Apart from the organisation, equipping, and training of a sufficient number of personnel to man the various services, there are a number of most important measures which aim at reducing the effects of the enemy's attacks and making it more difficult for him to locate his objectives. The most important are the provision of a warning system, shelters, black-out, arrangements for the evacuation of certain classes of the population, and measures of structural precautions for vital machinery and installations.

Unless a warning can be provided the public will not be able to get under cover or shelter of some kind and casualties will be greatly increased. The provision of shelters is clearly important, though in these days an extremely costly matter in both money and materials, as are also any structural precautions to protect machinery. A black-out is still essential despite its depressing effects and the fact that it undoubtedly tends adversely to affect production.

The evacuation of certain classes of the population from possible target areas, especially children, can help materially to reduce casualties and moreover is highly important when the country's future is considered. These measures raise a number of difficult social problems, as the Germans found no less than ourselves, and as is perhaps natural these difficulties are most apparent during lull periods in the bombing. There is no doubt, however, that all these measures are of great importance. Not only do they give confidence to the public, but, if well planned and executed, they will help to reduce casualties and damage and so ease the burden on the Civil Defence services.

The other main problem of Civil Defence is to recruit, organise and

train forces to combat the fires and damage and to deal with the casualties resulting from air attacks. In Britain the forces concerned are the Public, the Fire Service, the Civil Defence Corps, the National Hospital Service, and Industry and Public Utilities.

Certain of these forces already exist and have a normal peacetime role; others have to be created and maintained on a nucleus basis in peacetime, though designed to be capable of very rapid expansion in time of emergency. Even those services which already exist will need to expand and must equally recruit volunteers.

The Police would have special duties in wartime unconnected with Civil Defence, as well as an important role in that service, and for this purpose must recruit auxiliaries in peacetime. The Fire Service would expand also through the Auxiliary Fire Service.

A special reserve is created to allow for the wartime commitments of the National Hospital Service, known as the National Hospital Reserve, a part of which includes the Ambulance Service. Industry will need to recruit and train volunteers to man its own service, which is known as the Industrial Civil Defence Service. Public Utilities will have to carry out their normal work, though some of it will be on an urgent basis and much of it on a far wider scale than anything in peacetime.

The Civil Defence Corps itself must be created as a new organisation and it consists in England and Wales of five sections: Headquarters, Warden, Ambulance, Rescue, and Welfare. In Scotland there is no Ambulance Section, this service being operated centrally by the Department of Health for Scotland.

The Headquarters Section provides personnel to man the Control and Sub-Control Centres from which Civil Defence operations are conducted. It also provides a Sub-Section for reconnaissance duties of a general and technical nature. Emergency communications are also included in the Headquarters Section responsibilities, i.e., wireless, field telephones, and despatch riders.

The Warden Section provides in wartime a network of warden's posts and with the police provides the direct link with the public and must play a very important part in helping to maintain public morale. They are also the chief agents for reporting casualties and damage and so setting the Civil Defence operational machine in motion. They have many other miscellaneous duties, such as reporting the presence of unexploded bombs and helping the police to evacuate the living in the vicinity. In the majority of areas the Warden Section comes under the Chief Constable, though remaining an entirely separate organisation to the police.

The Ambulance Section is based on that which already exists and its duties need no elaboration. All personnel have to be fully trained in first aid.

The Rescue Section is organised on a basis of parties of eight men, including the leader and the driver. Each party has a special vehicle equipped for full rescue work. The task of this section is one of the most onerous in the service and consists of the rescuing of persons trapped in collapsed buildings. All members are also fully trained in first aid. A proportion of all volunteers should, if possible, have a knowledge of building construction.

The Welfare Section really consists of a number of separate services

and covers such duties as emergency feeding, emergency clothing, staffing of rest centres and information centres. This Section provides for one of the most important aspects of Civil Defence operations, that of looking after the needs of all those who are rendered homeless or are otherwise in difficulties as a result of the bombing. The emergency feeding side is linked up with the general emergency feeding arrangements and certain other duties are, to some extent, an extension of existing local authority services. In this Section the majority of volunteers are women and great help is given by the Women's Voluntary Services.

These five (or four) sections form the local divisions of the Civil Defence Corps and each of the principal local authorities in Britain has the responsibility of organising, recruiting, and training a division. In England and Wales this responsibility rests on the county boroughs and counties and also the following specially scheduled non-county boroughs: Chesterfield, Cambridge, Scunthorpe, Swindon, and Luton. In Scotland the authorities are the cities, large burghs, and counties.

The Police and the Fire Service are also organised on a local authority basis, but in wartime the Fire Service would be nationalised. Industrial establishments employing more than a certain number (probably 150) have an obligation to organise Civil Defence on broadly the same lines as the local authority division. They are also concerned with the question of due functioning, i.e. the maintenance of production. The Public Utilities are concerned with the maintenance and repair of their installations.

In order to carry out their functions local authorities have appointed a Civil Defence Officer or Assistant Civil Defence Officer and a general and a rescue instructor; all on a whole-time basis. For the rest the duties are carried out by the permanent officials of the local authority such as the Clerk, Chief Constable, Engineer, and Medical Officer of Health. The training of the volunteers is carried out mainly by locally trained instructors working with the Civil Defence Officer and the whole-time instructors. Civil Defence is otherwise manned, in peacetime, by volunteers.

To cater for the training of instructors three Central Schools are provided by the Government at Easingwold in Yorkshire, at Falfield in Gloucestershire, and Taymouth Castle in Scotland. At these Schools general and rescue instructors are trained on courses lasting three weeks and special facilities are provided, including a gas range and a "blitzed" street where all rescue problems can be practised with the use of live casualties. Other courses are provided of one week's duration to convert locally trained instructors and of two or three days to give senior officers the necessary technical background.

The higher training necessary for senior officers and Civil Defence Officers is provided at the Civil Defence Staff College at Sunningdale Park near Ascot. Here long courses of 3½ weeks and short courses of one week are held where the broader problems of Civil Defence can be studied, and a Tactical Wing has recently been added. Tactical courses are held for instructors lasting three weeks and for senior officers and Civil Defence Officers lasting one or two weeks. The study of tactics to deal with the atomic bomb and other types of attack is conducted here.

At both the Staff College and the Tactical School representatives of all

the various services concerned with Civil Defence attend the majority of courses. In fact it is regarded as essential that these studies cover the widest field and the co-operative nature of Civil Defence operations is stressed. Many representatives from the Commonwealth and Empire, N.A.T.O., and other countries are also constant visitors at all the Schools. At local level there also exist schools which are normally combined with social centres.

The general direction and co-ordination of Civil Defence rests with the Home Office, though except for training Scotland is independent operating through the Scottish Home Department and the Department of Health for Scotland.

The responsibilities for the various parts of Civil Defence rest with the Ministries concerned. Thus, while the Home Office and the Scottish Home Department administer the Civil Defence Corps, the Ministry of Health and the Department of Health for Scotland are responsible for the emergency medical and hospital services and certain other tasks. The Ministries of Housing and Local Government, Food, Transport, and Fuel and Power also have major responsibilities in their respective fields. Northern Ireland is independent but works in the closest co-operation with the Home Government.

From a careful study of experience in the last war, including that of Japan with two atomic bombs, it has been found that fire caused the greatest amount of destruction, and can quite easily do so again, since the atomic bomb is capable of starting fires as a result of the heat flash. The other big problems will be the debris, the casualties, and the homeless.

It will be impossible, save under exceptional circumstances, for any vehicles to get through the debris much beyond a distance of 1 to  $\frac{3}{4}$  mile from ground zero (the point on the ground underneath the point of burst of an atomic bomb). The debris depth will vary from 2 to 10 feet or more depending on the width of streets and the height of buildings on each side of them. The clearance of this debris or the driving of a route through it will be a long term project.

From the point of view of life saving the first 48 hours is the critical period during which every effort must be made to effect the maximum rescue and other operations. If the public can be under cover, or better still in appropriate shelters, the casualties can be greatly reduced from those experienced in the two Japanese cities. But, even, so they are bound to be considerable and will present big problems of first aid and stretcher bearing.

There are bound to be large numbers of persons rendered homeless as a result of the physical damage which is inescapable if hostile bombers penetrate the defences and the most urgent steps will be required to get them under cover, deal with their various requirements, and get them back into circulation again as useful members of society.

The divisions of the local authorities are not designed, by themselves, to deal with a major disaster. It is hoped that they can take up the first shock, but they must be helped. Such help can come from neighbouring authorities to some extent, but in the main it is planned to be provided by Civil Defence Mobile Columns. In the last war such Columns were provided and did yeoman service, not only in Britain, but also in Antwerp. The ones planned to-day will be larger, probably about 800 strong—the

last war strength was 150-200—and they would be located in suitable tactical relationship to the probable target areas. Their principal task would be rescue and they would be equipped to look after themselves in all respects.

The Army has also a role to help Civil Defence, provided its operational commitments will permit, and the first response would probably be from the Home Guard. The other two Fighting Services would help on an ad hoc basis as they could.

It will be seen then, that two echelons of Civil Defence are planned. The local divisions, which are being recruited now, and the Mobile Columns. The present total strength is about a quarter of a million against a peacetime establishment of 600,000. Much larger forces would be required in war; but the peacetime aim is to provide a sufficiently strong and well trained nucleus to enable a very quick expansion to take place with reasonable smoothness.

The Fire Service are also planning Mobile Columns, and mobile police reinforcements would form a part of the wartime police organisation. The emergency casualty arrangements include, as well as ambulances, mobile first aid units and hospitals. This would entail, in time of war, the evacuation of all hospitals in the central areas of probable target centres.

A passing reference has already been made to the importance of Civil Defence to the North Atlantic Treaty Organisation, and no article on this subject would be complete without some reference to the progress of Civil Defence in the member States.

So far as the North American Continent is concerned the most energetic steps have been taken in Canada to set up a good organisation. At Federal level the Minister of Health and Welfare has the overall responsibility working through a Co-ordinator and a small staff located in Ottawa. Each province has a Minister with a responsibility for Civil Defence, operating also through a provincial co-ordinator, and thence to the cities and municipalities. There is a Federal School near Ottawa and provincial and municipal schools. Canada has somewhere in the region of 150,000 volunteers.

The United States directs Civil Defence from the President's own Executive Office through a Federal Civil Defence Administrator with a staff in Washington D.C. Responsibility is delegated, as constitutionally it must be, to the Governors of the 48 States (the District of Columbia has a special arrangement) and most States have a Civil Defence Director as have the cities, municipalities, and counties. The Federal Administration has also grouped States into seven Regions for purposes of mutual support and has appointed a small staff of regional administrators. There is a Federal all-purposes School at Olney (in Maryland) no great distance from Washington. The United States is aiming at a target of about 17 million volunteers, of which they have achieved about 4 million. It is interesting to note that the equivalent of the British Royal Observer Corps comes under Civil Defence. As in Britain, progress in America varies. But it is safe to say that most States have a firm organisation and many have made remarkable progress.

Civil Defence is being organised actively in Hong Kong, Singapore, Malaya, and Pakistan, and a start has been made in India. Aden has begun and active work is going on in Cyprus, Malta, and Gibraltar.

Australia has some skeleton plans. Of the European N.A.T.O. countries Norway, Denmark, and Holland are well ahead and progress is being made in Belgium and Greece. Italy has just started and it is hoped that France will shortly follow suit. Outside N.A.T.O. Sweden has got an excellent organisation and so has Switzerland. Eire is progressing steadily and well. Other countries which are taking the matter seriously include the Lebanon, Israel, and Transjordan. It is in fact true to say that North of the Equator interest in this aspect of defence is marked.

Civil Defence then has come to stay as an essential element in the defence system of any country liable to heavy or sustained air attack. It has many ramifications and complications, and it would be impossible to attempt to organise and train and make the necessary provisions at the last moment. If attack comes it must be expected early and in great strength in an attempt to deliver a "knock out" blow. Furthermore a country known to have neglected this vital side of her defensive system would be particularly vulnerable to such an attempt.

Civil Defence is the citizen's own Army, there to defend their homes, their lives, and the means by which a country can continue not only to exist, but to defeat the enemy. There can be no more important task and no more important part of the general insurance for peace which strength in every department of State will help to ensure.

JOHN HODSOLL



CHAPTER IX  
OPERATIONAL RESEARCH  
RECOLLECTIONS OF PROBLEMS STUDIED, 1940-45  
BY PROFESSOR P. M. S. BLACKETT

THE Armed Services have for many decades made use of civilian scientists for the production of new weapons and vehicles of war, whereas the tactical and strategical use of these weapons and vehicles has been until recently almost exclusively a matter for the uniformed Service personnel. During the first years of the Second World War circumstances arose in which it was found that civilian scientists could sometimes play an important role in the study of tactics and strategy. The essential feature of these new circumstances was the very rapid introduction of new weapons and devices, pre-eminently radar, into the Services at a time both of great military difficulty and of such rapid expansion that the specialist officers of the Armed Services, who in less strenuous times can and do adequately compete with the problems raised, found themselves often quite unable to do so. I will attempt to describe below how it was that civilian scientists, with initially little or no detailed knowledge of tactics or strategy, came to play a sometimes vital role in these affairs, and how there grew up a virtually new branch of military science—later to be dignified in the United Kingdom by the name “Operational Research”, or “Operations Analysis” in the United States. By the end of the war, all three Services had operational research groups of mainly civilian scientists either at headquarters or attached to the major independent Commands. These groups were, in varying degrees, in close touch with all the main activities of the Service operational staffs and were thus in a position to study the facts of operations in progress, to analyse them scientifically, and, when opportunities arose, to advise the staffs on how to improve the operational direction of the war. Rather than attempt a systematic history of the origin and growth of all the various operational research groups, which attempt would need access to many reports and files not now accessible to me, I will draw mainly on my own personal experiences, which, of course, only cover a small part of the developments of these interesting years.

In August 1940, during the early phase of the Battle of Britain, I was invited by Sir Frederick Pile to become his scientific adviser at the Headquarters of Anti-Aircraft Command at Stanmore. My immediate assignment was to assist the Service staff to make the best use of the gun-laying radar sets (GL.1 and later GL.2) which were then being delivered to the A.A. batteries around London. These fine sets, only just out of the laboratory stage of development, were initially liable to many technical defects, and civilian scientists both from the firms who manufactured them and from the research establishments (T.R.E. and A.D.R.D.E.) which designed them, were already actively employed on the gun sites, helping the Service personnel to get them to work satisfactorily. As this technical servicing aspect was being well looked after, the small group of

young scientists whom I hurriedly collected to work with me and which included physiologists, an astronomer, a mathematician, as well as physicists, soon found themselves studying both at H.Q. and on the gun sites a variety of problems connected with the operational use of radar sets, guns and predictors.

This group was not the first such group of civilian scientists studying operations, but it was certainly one of the first groups to be given both the facilities for the study of a *wide range of operational problems*, the freedom to seek out these problems on their own initiative, and sufficiently close personal contact with the Service operational staffs to enable them to do this.

Already in 1937-38 a civilian scientist, B. G. Dickins, had been posted to Biggin Hill to assist the operational staffs of the fighter group in the use of radar for intercepting enemy bombers. Sir Henry Tizard and Mr. A. P. Rowe, then Superintendent of the Bawdsey Research Station, were the initiators in this development. The great value of the scientific study of the tactics of interception by radar was amply proved by the work of Mr. Dickins, and the trials led to important changes in the organisation of Fighter Command. Many high Service officers realised that scientists had something to teach the Services as well as providing them with new equipment. At the outbreak of the war Mr. Rowe and Wing-Commander R. Hart were mainly responsible for sending a small group of scientists from Bawdsey to R.A.F. Fighter Command at Stanmore. This group played a very important part in working out the tactics of interception which played such a decisive part in the Battle of Britain.

One of the first important problems tackled by the A.A. Command group was how best to make use of the radar data to direct the guns. As the radar data came from the operators in the form of range, bearing, and, later, height, it was far too crude, in the sense of being subject to much too large errors, to be fed directly into the mechanical predictors then in use, which were, of course, designed for the reception of accurate direct visual observations. Very simple plotting methods were already in use in which the position of the enemy aircraft, as determined from the radar set, was plotted on a large sheet of paper, and from the plot estimates were made of the future position of the target. Then using range tables for the gun in use, the required elevation, bearing and fuze setting were passed to the battery verbally together with the moment to fire. This fire control system amounted to a system of predicted barrage rather than continuous prediction. Thus for a time predictors were not used at all in the battle against the night bombers, and it was necessary to return to the old pre-predictor age of manual plotting. This situation illustrates very clearly one of the gaps which operational research groups can help to close; the gap between the new instrument or weapon as developed in the research and development establishments, and its use in the actual conditions of war. Immense scientific and technical brilliance had gone into the rapid design and manufacture of the GL sets; likewise at a more leisurely pace into the design and construction of the guns and predictors. Understandably, but unfortunately, partly through shortage of scientific and technical personnel but also partly through a certain lack of imaginative insight into operational realities, hardly any detailed attention had been paid to how actually to use the GL data to direct the guns until the Battle

of Britain was in progress. Thus the first months of the A.A. battle against the night bomber were fought with highly developed radar sets and guns, but with the crudest and most improvised links between them, belonging technically to the level of the First rather than the Second World War.

One of the first important tasks of the A.A. Operational Research Group was to help to work out in a week or two the best method of plotting the GL data and of predicting the future enemy position for the use of the guns, on the basis only of pencil and paper, range and fuse tables. The second task was to assist in the design of simple forms of plotting machines which could be manufactured in a few weeks. The third stage was to find means of bringing the existing predictors into use in conjunction with the radar sets. This was found to be possible if, by intensive training of the predictor crews, the inaccurate radar data could be *smoothed* manually. A special school was set up by A.A. Command to work out the best methods of doing this and to give the necessary training. The fourth stage was to attempt to modify the predictors to make them handle the rough GL data more effectively. This proved possible with the Sperry predictor, leading to what came to be known as the *amputated* Sperry, which played a useful though limited role as an alternative to the use of plotting methods.

The problem of marrying successfully the radar data with a predictor was not solved satisfactorily until much later in the war. Only when in 1944 the much more accurate GL.3, using 10 cm. waves, came into operation and was linked with the new American electronic predictor, was a really adequate radar A.A. system attained. This combination, together with the proximity fuse, came just in time to compete brilliantly with the V1 menace in the summer of 1944.

Soon after the formation of the A.A. Operational Research Group in August 1940, a problem of a quite different character came up in the following way. In the night defence of London only those A.A. batteries which had radar sets could play any useful part, but there were not enough GL sets to supply more than one half of the 4-gun batteries in the London area, so reducing the effective defensive power of A.A. Command to one half of its nominal strength. The Operational Research Group attempted to weigh up the advantages and disadvantages of the existing deployment of the available 120 or so guns in 30 four-gun batteries compared with their possible deployment in 15 eight-gun batteries. The then existing location of 30 four-gun batteries had been based on the requirement to cover the whole of the London area by the field of fire of some battery. The batteries were therefore so located that circles on the map drawn round each battery with a radius equal to the maximum effective range of the guns effectively covered the whole area. If, however, in the interests of giving each battery a radar set, the number of batteries were reduced to one half, clearly a considerable area, in fact about one half of London, would no longer be covered by the fire of any gun. The problem was to assess the penalty resulting from halving the area of London covered. Investigation showed that the penalty was so small as to be quite unimportant compared with the calculated gain by the adoption of fewer eight-gun sites, so giving every gun access to radar information. For, when looked into in more detail, the "complete cover" provided by the

30 four-gun sites turned out to be illusory. The conception of complete cover must have originated in the days when slow aircraft were engaged visually in daylight, and just did not apply to the conditions of 1940 when fast aircraft were being engaged at night by means of radar. In the latter condition a battery could only usefully engage an enemy bomber coming more or less towards the battery, and while the bomber was in a rather narrow crescent-shaped zone limited on the one hand by the maximum effective range of the guns and on the other by a minimum distance from the guns set by the maximum rate of change of bearing and elevation which could be handled by the radar sets and the plotting methods used. So, even with the 30 four-gun batteries, there were large areas of London over which enemy aircraft could not be fired at at night. The concentration of the available guns into fewer eight-gun batteries certainly increased this blind area, but also greatly increased the chances of a successful engagement in the area still covered, since all the guns now would be fed with radar information. If the enemy bombers had done precision bombing runs, a case could be made for keeping them continually under fire, however ineffectively, in order to disturb their aim. However this was not the case; the night bombing at that time was area bombing of London; precise aiming had no relevance. What remained legitimate in the demand for complete cover of the area of London was the demand that the periphery of London should be completely covered so that no enemy aircraft could get through without coming within the range of some battery, and further that the blind areas inside the periphery should not be so large as to become known to the enemy pilots. Since these two conditions could be satisfied with the 15 eight-gun sites, the theoretical case for a re-deployment was complete. A number of eight-gun batteries were formed in accordance with these ideas, but practical considerations and a speeding up of the arrival of new GL sets made a full re-deployment unnecessary.

This example of operational analysis, though not perhaps leading to spectacular operational gains, is given in some detail as an example of the value often attending the critical analysis by operational research groups of the established doctrines and objectives of a Service command, with a view to seeing if they are related to the existing circumstances. Sometimes it is found that they were once quite correct, but that they have become out of date by changing external circumstances. Later it became established practice to subject as many as possible of the rules and dogmas of a fighting Service or Command to critical but sympathetic analysis. In nine cases out of ten, the rules or dogmas were found to be soundly based; in the tenth, sometimes, changed circumstances had made the rules out of date. Further cases of this will be described in connection with operational research at Coastal Command and at the Admiralty.

My last example from the work at A.A. Command during my period of work there, August 1940 to March 1941, is of still another character, being concerned with the statistical checking of intelligence reports. Incidentally, it contains an element of discovery of the unexpected in the sense in which the words are used by natural scientists.

A.A. Command were clearly greatly interested in the effectiveness of their A.A. gunfire, and to measure this calculated the average number of

A.A. shells which were fired by each battery to destroy one enemy night bomber. At the start of the blitz, when control methods were poor, the "rounds per bird," as we called this number, was about 20,000. As methods and instruments improved this gradually fell to some 4,000 the following summer.

On looking into the rounds per bird achieved by the different regional defences, it was noticed with surprise that the coastal batteries appeared to be shooting twice as well as those inland; their rounds per bird were only about one half. All kinds of far-fetched hypotheses were considered as possible explanations of this strange result. Were the coastal guns better sited, or did the radar work better over the sea? Perhaps the enemy aircraft flew lower and straighter than over the land. Then suddenly the true explanation flashed into mind. Over the land a battery, say, in the Birmingham area, which claimed an enemy aircraft destroyed, would have this claim checked by the search for and identification of the crashed machine. If no machine were found, the claim was disallowed. But, in general, no such check could be made of the claims of the coastal batteries, since an aircraft coming down at sea would not be traceable. The explanation of the apparent better shooting of the coastal batteries turned out to be due, therefore, to an overestimate by the coastal batteries (as by almost all other batteries) of their claims of enemy aircraft destroyed, by a factor of about two. This explanation should have been thought of at once, as there is plenty of experience to show that unchecked combat claims, made in absolute good faith, are generally much too high.

The same over-optimistic and multiple reporting might be expected in any complex battle such as, for instance, the daylight phase of the air battle over southern England in August and September 1940. A careful check was therefore made of the number of enemy aircraft crashing on land during this time. If my memory serves me right, the number amounted to less than 20% of the Air Force claims of aircraft destroyed. Even making a generous allowance for the many aircraft which must have crashed in the English Channel, it was very difficult to believe that the true number of enemy aircraft destroyed was more than about one half of those claimed. It was therefore no surprise when the capture of the archives of the German Air Force in 1945 revealed that their combat losses in the Battle of Britain were less than half the British claims. This easily explicable exaggeration of claims in no way detracts from the brilliant and gallant fight of Fighter Command against heavy odds throughout the late summer of 1940. The fight was decisively won, and with it Hitler's Germany met her first defeat. From this defeat sprang the actions which led to Hitler's final overthrow. So in this case the misreporting of enemy losses had no serious adverse consequences, and some favourable ones to the sorely tried British national morale; but under somewhat other circumstances it might have had serious consequences. This tale has a moral—even if a very obvious one. All intelligence reports must be checked, wherever possible, by statistical and other scientific methods. A case where failure to do this, or rather a failure to act on the conclusions reached, did have serious consequences will be described later.

The three examples quoted here of operational research work carried out at A.A. Command during my time there—the study of the best methods of conveying radar information to the guns, the problem of the

best deployment of guns and radar sets in the London area, and the checking of claims of enemy aircraft destroyed—are alike in one respect: the work could not easily have been done at the time except by the existence of groups of scientists in close contact with the Service staffs directing the operations. Scientists in the research and development establishments could not, in general, have known enough about the operational facts; the Service personnel at Headquarters were too busy with immediate operational duties to undertake such analytical work, which anyway was better done by scientists trained in the techniques of original investigation.

When, in March 1941, I was posted to Coastal Command, on the initiative of Air Marshal Sir Philip Joubert, to advise on problems arising in the air war against the U-boats, I had a fairly clear idea of how I thought an operational research group at an Air Force Command should be organised and what sort of work it was competent to do and what it should not attempt. Amongst the things to avoid were: not to take on any responsibility for technical trouble-shooting in the new Service equipment—this must be left entirely to the technical branches of the Service in collaboration with the research and development establishments and to the manufacturing firms; not, in general, to take on any daily routine responsibilities in relation to the staff work of the headquarters, but rather to keep the group free for non-routine investigations and researches. On one organisational point I was most insistent. The operational research group must be an integral part of the Commander-in-Chief's staff and all the reports or recommendations must be to the C-in-C of the Command and not to the Air Ministry direct. The importance of this lies in the fact that a considerable part of the work of an operational research group at a Command must inevitably involve criticisms of the work of the Command coupled with suggestions for improvement. For any part of the Command's work in which no improvement seems possible is not likely to be subject of a report by the group. When, however, the group find, say, that some tactics in use are faulty and could be improved, their report would necessarily have a critical character. If these reports were sent (as at one time was the suggestion) direct to the Air Ministry, then the staffs at Command would rightly feel aggrieved and the intimate collaboration between operational Service staffs and operational research workers, which is the essential basis of fertile operational research, would become impossible. If, however, the report went to the C-in-C, and if the recommendations were adopted successfully, the Air Ministry would hear of it first as a successful achievement of the Command itself.

Within a few months I had collected together a group of young scientists at H.Q. Coastal Command. I was both director of the group and, at the same time, personal scientific adviser to the C-in-C, Air Marshal Sir Philip Joubert, who had by then succeeded Air Marshal Sir Frederick Bowhill. Amongst the many problems investigated by the group during the time, from March 1941 to January 1942, when I was at Coastal Command, a few stand out especially vividly in my memory, some because of the importance of the results achieved and some because of the points of method which they illustrate.

One of the most striking from both points of view was the case of the depth setting of the depth charges dropped by Coastal Command aircraft against U-boats. As soon as I arrived at Coastal Command, I remember



studying the inevitably fragmentary reports from air crews of the attacks made on U-boats in the previous few months and wondering why it was that they had proved relatively unsuccessful, as judged by the number of U-boats reported sunk. Enlightenment came from a stimulus from another quarter. In the spring of 1941, the late Professor E. J. Williams was attached to the Instrument Department at the R.A.E. Farnborough and had been asked to consider the possibility of designing a depth charge with a proximity fuse, which would explode, as it fell through the water past the U-boat, at whatever depth the U-boat happened to be. It was reasonably thought that such a weapon would be much more effective than the conventional depth charge which had to be set to some pre-determined depth. A few months later Williams joined the Coastal Command group and, with the requirement for the proximity depth charge in mind, started to analyse the reports of air attacks on U-boats with the idea of estimating the actual depth of the submarines at the instant of attack. As soon as a U-boat sighted the attacking aircraft, it dived so as to get as deep as possible before the depth charge reached it. So the earlier the aircraft was sighted the deeper was the U-boat at the time of attack. On the assumption that a U-boat would, on the average, sight the attacking aircraft some two minutes before the instant of the attack, and that in this time it could dive to about 100 feet depth, the Coastal Command and Admiralty orders were that depth charges were to be set to explode at 100 feet depth.

Williams spotted a fallacy in the argument leading to the 100-foot depth setting. It might be true that *on the average* a U-boat might sight the aircraft a long way off and so manage to get to 100 feet depth before the attack. However, just in these cases the U-boat had disappeared out of sight of the aircraft for so long that the air crew could not know where to drop the depth charges, so that the effective accuracy in plan of the attack was inevitably very low. Williams drew attention to the few cases when the U-boat failed to see the aircraft in time and so was on the surface when attacked. In these cases the bombing accuracy in plan was high, as the U-boat was visible at the time of attack. However, Williams pointed out that just in these cases the explosion of the depth charges at 100 feet would fail to damage seriously the U-boat, as the radius of lethal damage of the depth charges was only about 20 feet. Thus the existing method of attack failed to sink deep U-boats owing to the low bombing accuracy and failed to sink surfaced U-boats due to the deep depth setting. Williams calculated that if the depth setting were reduced from 100 feet to 25 feet, one would expect the average number of U-boats sunk for a given number of attacks to be increased by two and a half times. After some time spent in convincing the relevant departments that the argument was correct, and after some minor technical difficulties had been overcome, the shallow depth setting was introduced into Coastal Command in early 1942 with spectacular results. Captured German U-boat crews thought that we had introduced a new and much more powerful explosive. Actually we had only turned a depth-setting adjuster from the 100-foot to the 25-foot mark. There can be few cases where such a great operational gain had been obtained by such a small and simple change of tactics.

In the light of this result, Williams showed that the proximity depth charge pistol, on which he had previously been working, was not needed.

For, though perhaps better than the standard depth charges with 100-foot setting, it was little better and much more complicated than the standard depth charge with the 25-foot setting. This story has several morals. It may be considered as an example of the old military precept to concentrate offensive effort on the good targets and ignore the poor targets. Then, too, it teaches that it is generally wise to understand fully the possibilities of better use of existing weapons before asking for new ones. Finally, the importance of keeping operational orders under critical but sympathetic analysis is evident.

My next story begins one night in April 1941 in the operations room of the C-in-C Western Approaches in Derby House, Liverpool. On a large wall map were displayed the guessed positions of U-boats in the Atlantic. From the recorded number of hours flown by Coastal Command aircraft over the relevant area, in a few lines of arithmetic on the back of an envelope I calculated the number of U-boats which should have been sighted by the aircraft. This number came out about four times the actual sightings. This discrepancy could be explained either by assuming the U-boats cruised submerged or by assuming that they cruised on the surface and saw the aircraft and dived before being seen by the aircraft in about four cases out of five. Since U-boat prisoners asserted that U-boats seldom submerged except when aircraft were sighted, the second explanation was probably correct. How then could one raise the chance of the aircraft sighting the U-boat first other than by the use of radar? All the obvious courses of action were considered and recommended where necessary—better lookout drill for the air crews, better binoculars, etc. Then the best direction of aircraft course in relation to the sun was considered. If the aircraft flew down sun, the U-boat crew might have more difficulty in seeing it. Discussing these questions one day in Coastal Command, a Wing Commander said casually: "What colour are Coastal aircraft?" Of course, I knew they were mainly black as they were mostly night bombers such as Whitleys. But before the question was asked me, I had missed the significance of the fact. Night bombers are painted black so as to reflect as little light as possible from enemy searchlights. When there is no artificial illumination by searchlights, an aircraft of any colour flying at moderate or low height, both by day and night, is normally seen at a great distance as a dark object against a lighter sky and only seldom as a light object against a darker sky. The only exceptions to this are, in general, when the sun or moon is reflected off some part of the surface of the aircraft as off a mirror. But common experience shows that this happens but rarely and never when the sun or moon are not shining. The lighter the colour of an aircraft, the less dark in general will it appear against the lighter sky, and so the less easy will it be to see. It would seem, therefore, that the best colour for a Coastal Command aircraft, particularly in the North Atlantic where there is much overcast weather, would be white. Model and full-scale tests were made of the average sighting distances of white aircraft compared with black, and it was found that the average distance at which a white aircraft was sighted was about 20% less than the distance at which a black aircraft was sighted. Using this numerical result, Williams calculated that a white aircraft would catch the submarine on the surface on 30% more occasions than a black one would, and so should sink 30%

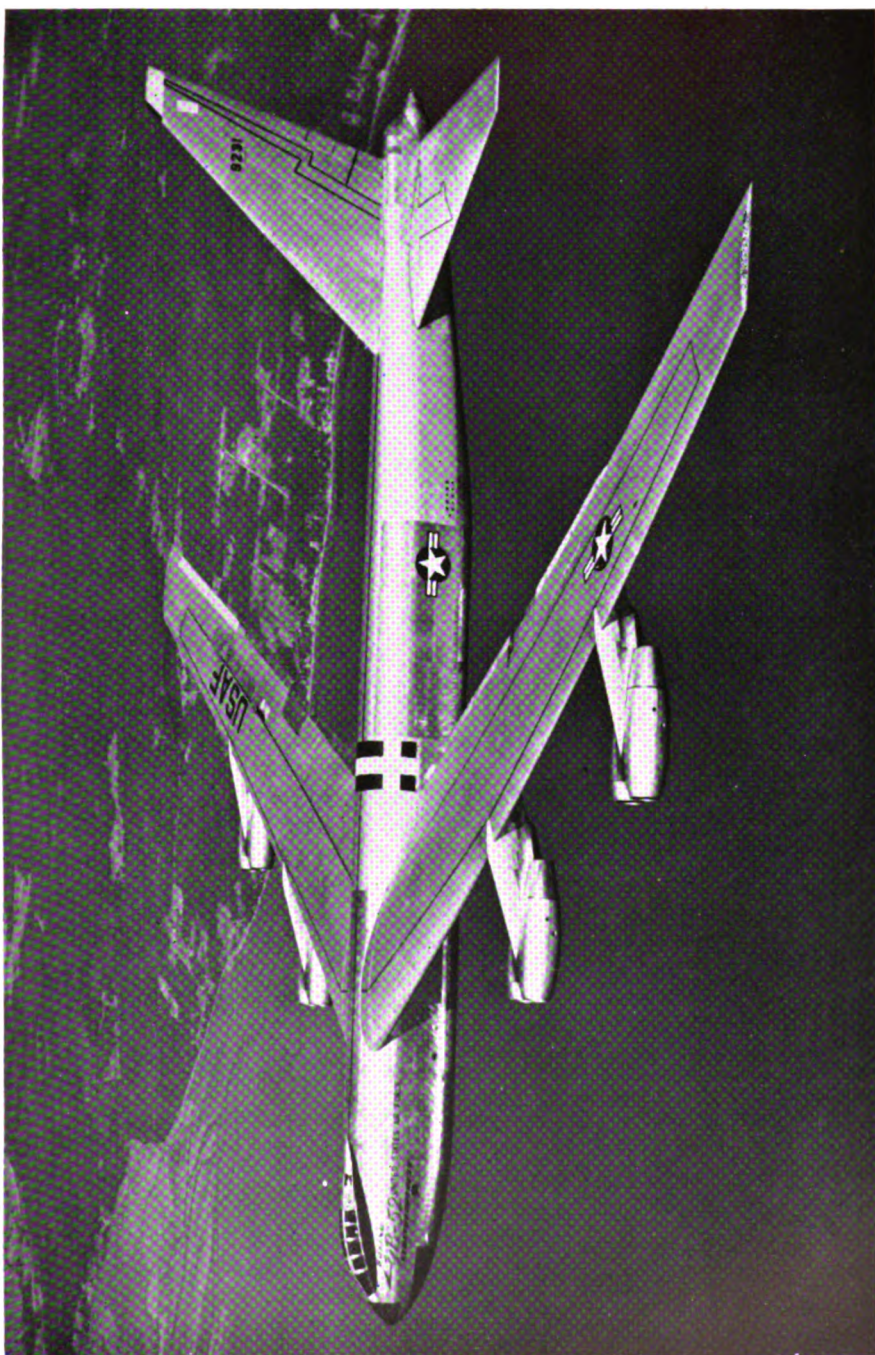
more submarines for the same number of sightings. Within a few months, all Coastal Command anti-submarine aircraft were painted white. No direct statistical check on the accuracy of the calculated gain could be made, since the number of U-boats sunk was rising so rapidly month by month due to a variety of causes, but it is possible to be confident that this admittedly belated recognition of the importance of the colour of anti-submarine aircraft was a contributing factor.

It may seem strange, in retrospect, that such a simple matter as the best colour for an aircraft, a matter which after all is only a special case of the much publicised and investigated subject of camouflage, could have been overlooked. The scientific effort in choosing the right colour for the aircraft was negligible compared with the effort then being put into many other aspects of the anti-submarine war. This example emphasises the importance of applying scientific method to *all* aspects of a given tactical problem—even to the simplest and most obvious ones.

I have already pointed out, for instance in connection with the problem of the siting of anti-aircraft guns, the importance of keeping a clear grasp of the numerical magnitude of essential average values of the numerical probabilities of achieving given results. One finds quite often that any conception of 100% cover, defence, or 100% search efficiency, is completely unattainable and that, in fact, wars are won (or lost) by the addition of large numbers of small successes (or failures) for each of which the probability at any given operation is small. I remember well a discussion at Coastal Command in the spring of 1941 which illustrated this point.

The long-range German aircraft, the Focke-Wolf 200, were taking a heavy toll of our shipping west of Ireland. To meet this there were available only a few Beaufighters. The problem was how best to use these fighters. A strong case was argued by the operations staff for the following procedure. Suppose the FW200s were known to be operating mainly in an area west of Ireland 200 by 200 miles. Suppose further that a single Beaufighter could "sweep" a lane 20 miles wide, that is, that an enemy aircraft could be expected to be sighted at a distance of 10 miles. It was argued that the best tactics would be to wait until all the available ten Beaufighters were serviceable and then to fly them equally spaced over the area, so that the ten swept lanes, each 20 miles wide, would cover the whole area of supposed operations of the FW200s. In this way it was hoped the area would be "swept clean", that is, any enemy aircraft operating that day would certainly be sighted.

The disadvantage of only flying when all ten fighters were serviceable was clearly that on most days no fighters would be out at all; moreover perhaps the day the fighters flew the enemy would not. The alternative was, of course, every day to fly any fighter when serviceable, even if only one, so as to have a chance, even though a small one, of sighting an enemy aircraft every day. The controversy between the exponents of the two tactics resolved itself into how to compare the theoretical certainty of sighting any enemy aircraft flying on the few days when all ten fighters were flown, with the sum of all the small chances of sighting the enemy on all the days when any aircraft were flown. The view of the Operations Research Section was that the two tactics gave about the same overall chances of sighting the enemy, assuming that the enemy flew every day



Boeing Y.B.52 8-jet Bomber



and that the same amount of flying were done, but that in practice for many reasons there was a very strong case for flying every day with all available aircraft, however few. In the course of long arguments on this controversy, a view was expressed which revealed a not uncommon misconception about a problem in the theory of probability. The fallacious argument was as follows. When ten aircraft were flown, the whole area was swept clean and the chance of sighting the enemy was 100%; *that meant that it was certain he would be sighted*. When, however, any fewer number of fighters were flown, then the chance of sighting the enemy was less than 100%; *in that case he might not be sighted at all*. The last statement is, of course, correct; the misconception lay in an exaggerated estimate of the actual probability of his "not being sighted at all". That probability can be calculated mathematically by the application of what is known as "Poisson's Distribution"—which I refrain from quoting out of consideration for my non-mathematical readers—to the actual terms of the problem of search; and it turns out to be much smaller than the crude statement above would seem to suggest. I remember having a table of the values of this probability circulated round the staff of A.A. Headquarters during the blitz, as a warning against neglecting the factor of statistical error when analysing combat results, and thereby drawing false deductions and adopting measures which the facts did not actually justify.

At a more everyday level the controversy centred on the obvious truism, already brought out by the case of the A.A. defence of London, that success in most operations of war in general and almost all operations of air war, is due to the sum of a number of small victories, for each of which the chance of success in a given operation is small. These simple, but not unsubtle, points of probability theory, a practical understanding of which is of the utmost importance for the correct control of air operations, were the subject of many lively discussions between the Operational Research group and the operational Service staff at Coastal Command. Finally the Operations Research view prevailed and the Beaufighters were thereafter flown whenever serviceable. The arguments for success by summing small probabilities seemed won against the arguments for gambling on an occasional certainty.

A few days later, I was met with the pleased tribute from the Controller of Operations: "I say, Blackett, I am so glad you explained to me all about probability. As soon as the war is over I am going straight to Monte Carlo and then I really will win."

In December 1941 I was asked to talk to a few senior Naval officers and Admiralty scientists on my experiences of operational research at A.A. and Coastal Command, with a view to the possibility that the Admiralty might start such a group. The preparation of this talk led me to try and put simply and clearly what operational research could and should do, and what it should not attempt. I afterwards expanded these notes into a short and rather flippantly written memorandum entitled "Scientists at the Operational Level", which, somewhat accidentally, achieved a fairly wide circulation as a secret document. It appears to have had influence in the United States as well as in the U.K. in guiding the formation of several new operational research groups. This memorandum dealt mainly with the broad function and organisational patterns

of the operational research groups of which I had experience. About the same time, I started to make notes on a number of points of scientific method which I had found to be of importance in the actual work of the groups. Some time in 1943 I finally collected these notes together in the form of a memorandum entitled, rather pedantically, "A Note on Certain Aspects of the Methodology of Operational Research," which was also circulated as a secret paper. After the war both documents were made available for publication by the Ministry of Defence and published in "The Advancement of Science"—the quarterly journal of the British Association, Vol. 5, 1948. The second paper gives a theoretical account of the methods used, together with many numerical examples.

In January 1942 I moved from Coastal Command to the Admiralty and started building up an operational research group to deal with Naval matters. Much of the initiative in bringing this group into being lay with the Director of Anti-U-boat Operations, Captain, now Admiral, Sir George Creasy. The group, which later was named the "Department of Naval Operational Research" (D.N.O.R.), was placed directly under the Vice-Chief of the Naval Staff, but worked not so much as an independent department but as an aid to, and in close collaboration with, the various operational departments in the Admiralty.

The group were most active in problems of the anti-U-boat war and worked in close contact with the group at Coastal Command, then under the direction of the late Professor E. J. Williams, F.R.S., and later of Professor C. H. Waddington, F.R.S. Of particular importance was the continuation of the scientific study of the tactics of the air war against the U-boats which had been started the previous year at Coastal Command. Since Coastal Command was under the operational control of the Admiralty the air war was a joint responsibility of the two Services. From the summer of 1941 until the virtual defeat of the U-boat campaign in the summer of 1943, a battle of technical and tactical wits was waged over the Atlantic between aircraft and enemy submarines.

In 1941 some Coastal Command aircraft began to be fitted with airborne radar sets by which it was possible to detect a surfaced submarine even though it could not be seen visually because of darkness or bad visibility. Then sets known as ASV (air-surface-vessel) and worked on  $1\frac{1}{2}$  metres wavelength. Owing, however, to the relatively low performance of these sets, not very many sightings were made with them by day, and they were not accurate enough to make possible actual attacks by night. Later in the year Coastal Command aircraft began to be fitted with special searchlights (Leigh Lights) with which to illuminate a surfaced submarine located by ASV at night. A few night attacks of this kind so frightened the U-boats that they began to submerge by night and remain surfaced by day, and so exposed themselves to the attacks by all Coastal Command aircraft whether fitted with ASV or not. After some months they found this too dangerous, so they reverted to surfacing to charge their batteries mainly by night, and attempted to counter the night attacks by fitting radio sets which could listen for and so give warning of the approach of an aircraft fitted with  $1\frac{1}{2}$  metre radar. This success for the U-boats was short-lived, for in 1942 a new radar set working on 10 centimetre wavelength was introduced into Coastal Command.

The invention in the Physics Department of Birmingham University



of the magnetron which made centimetric radar possible was, of course, one of the most decisive technical developments made during the war. Brilliant technical developments at the Telecommunications Research Establishment (T.R.E.) of the Ministry of Aircraft Production produced the 10 cm. ASV set for Coastal Command, the AI set for Fighter Command and the H<sub>2</sub>S set for Bomber Command. At the corresponding Air Defence Research and Development Establishment (A.D.R.D.E.) under the Ministry of Supply the GL.3 set was produced for A.A. Command. All these sets, in their respective fields, played a decisive part in the last years of the war.

As soon as the 10 cm. ASV was introduced into Coastal Command, U-boat sightings by radar rose rapidly and a very satisfactory monthly toll of U-boats were sunk. The German U-boat Command were very slow in tumbling to what had happened, and even later on, when a captured 10 cm. equipment told them the wavelength of our new radar sets, they were very slow to fit adequate listening sets.

The U-boats seemed at first more frightened of the night attacks than the day attacks, for they began again to surface by day and attempted to fight off the air attacks by gunfire. In this they had little success and they exposed themselves to very heavy and continuous air attack. Later they were forced to spend much of both day and night submerged, so enormously reducing their freedom and range of action. During these months the number and efficiency of the naval anti-submarine escort vessels was steadily increasing, and this combined with the rapid increase of the air effort led to almost complete victory in the U-boat war by the summer of 1943.

All these tactical developments were studied and analysed by the Operational Research Groups at Coastal Command and at the Admiralty. Careful statistical studies were made of the number of hours flown by Coastal aircraft, of the number of U-boats believed to be at sea. From these figures and the known range of detection of a U-boat by radar and visual means, the expected number of U-boats contacted could be calculated—assuming, as was the case at first, that the U-boats spent nearly all their time on the surface. These expected numbers of sightings were then checked up against the actual numbers of sightings. So long as the numbers agreed statistically, then it was concluded that the U-boats were still operating on the surface. When the day sightings fell below the expected number, it was deduced that the U-boats were submerged by day. When the night sightings fell off too, then the U-boats were deduced to be submerging also at night. When a U-boat, contacted by radar, dived before the aircraft got close enough to be seen visually by the U-boat, it was deduced that the U-boat must be fitted with a radar listening device.

In this way a very close statistical check was made of all phases of this decisive air campaign against the U-boats. All the tactical resorts to which the enemy were driven could be followed, and the best tactics could be devised to meet them. The results of operational research, reports of hours flown, U-boat densities, search rates, calculated sightings, statistical uncertainties and the like, became a normal part of the discussions of the fortnightly Anti-U-boat Committee meetings at No. 10 Downing Street under the chairmanship of the Prime Minister.

Here I intend to break the narrative of the scientific analysis of the anti-U-boat war to describe some simultaneous investigations on quite a different subject, but one which later became intimately linked with the air war against U-boats.

In March 1942, I became involved in the study of the theory and practice of the bombing offensive. This arose in the following way. The Prime Minister had asked the Air Staff to write an appreciation of the possibility of assisting our sorely tried Russian allies in their great land battle by extending the British bombing offensive against Germany. The basis of such an appreciation was to be an analysis of what had been achieved by the British bombing offensive in the previous eighteen months. The Air Staff report to the Prime Minister was also sent for information to the Admiralty and I was asked to comment on it. I found that estimates of the probable future efficiency of the bombing offensive were based on intelligence reports on the results of past raids on Germany. These intelligence reports, some of which seemed to be unduly optimistic both as regards destructive effects and effects on morale and production, seemed mainly to be derived from reports emanating from neutral capitals, and there seemed no direct way of checking their reliability. I therefore set about the task of checking these reports statistically, by using as a basis the known results of the German bombing offensive on Great Britain. The relevant calculations were, in themselves, extremely simple, though a considerable background of knowledge of other matters not appearing directly in the calculations was needed to be confident of their accuracy.

"In the ten months from August 1940 to June 1941, the total weight of bombs dropped on the United Kingdom by the enemy was about 50,000 tons, that is, at the average rate of 5,000 tons per month. The number of persons killed was 40,000, or an average of 4,000 per month, giving 0.8 killed per ton of bombs.

Static detonation trials showed that the British G.P. bombs then in use were about half as effective as the German light-cased bombs of the same weight. Hence, these bombs should produce only 0.4 killed per ton, when dropped under the same conditions. Our bombers had further to go to their targets, the enemy towns were less easy to find and were smaller, and no radio aids were then available. One must therefore assume that the fraction of bombs falling in built-up areas in Germany was not more than half of the fraction of German bombs falling on built-up areas in Great Britain. Hence we should expect 0.2 killed per ton of bombs dropped. During 1941 an average of about 2,000 tons of bombs were dropped on Germany per month. The expected number of killed is therefore  $2,000 \times 0.2 = 400$  per month." *The Advancement of Modern Science*, Vol. IV.

Since the normal civilian road casualties in Germany amounted to some 700 killed per month, one would not expect the casualty aspect of our bombing offensive on morale or production in 1941 to have been of much significance.

The accuracy of this estimate of civilian casualties, which was an order of magnitude lower than that deduced by the Air Ministry from Intelligence Reports, could not finally be checked until after the war. The actual number of German civilians killed in 1941 was 200 per month, just one half of my estimate.

Since by 1942 it was clear that the war would be a long one and that resources in manpower, especially skilled manpower, might well prove decisive, it seemed useful to draw up a balance sheet of manpower losses to the enemy and to ourselves resulting from the 1941 bombing offensive.

The average number of bomber sorties per month, then mainly by Wellingtons, was 1,000, and of these some 40 were lost with their crews of 5 men, giving a loss of airmen, all highly skilled men, at the rate of 200 per month. Comparing this with the estimated number of enemy killed, that is, 400 *men, women, and children* (now known to be twice too large), it was concluded that in the matter of personnel casualties the 1941 bombing offensive had been nearly a dead loss.

A similar analysis of the probable effects of our bombing offensive on German production, based on the known effects of German bombing on British production, led to the conclusion that the reduction in German production was almost certainly less than 1%.

Probably the only way the British bombing offensive in 1941 had brought appreciable help to the Russian armies was through the diversion to defensive use of enemy military resources in fighters and A.A. guns, and civilian resources in civil defence and repair personnel. The numerical assessment of this indirect effect was difficult. If it had then been recognised realistically that this secondary function of drawing fighters from the eastern zone to defend Germany, rather than the damage done to German industry, was the main way in which the bombing offensive could help Russia, the bombing offensive would have been planned rather differently. For instance, there would have been much more diversity of target and less expensive repeated hammering at a few highly defended targets. The operation would have been planned to divert the maximum possible number of fighters rather than to inflict the maximum damage.

Later in the war, particularly in 1944, the bomber offensive became incomparably more effective, due to the introduction of very large numbers of four-engine aircraft and of radio navigational aids and the development of path-finding tactics. The results of this campaign have been told with a wealth of statistical detail in the United States Bombing Survey Reports. From the analysis in these reports it is deduced that German production was reduced by 9% in 1943 and 17% in 1944.

The Admiralty passed on to the Air Ministry a paper by me setting out these arguments and figures in detail. If my memory is right, it was in April 1942 that a Cabinet Office paper was issued on the probable effect of the bombing offensive in the subsequent eighteen months. This paper implicitly accepted the method I had employed of using the data from the German bombing offensive against Britain as a basis for calculating the expected effect of a given weight of bombs on Germany. But now the emphasis was on the destruction of housing rather than of people or factories. Data on the house area destroyed in the Midland industrial cities of England in 1940-41 for a given weight of bombs dropped was used to calculate the fraction of German housing which could be destroyed in the next eighteen months, that is, by the autumn of 1943. The claims were high—something, I think, of the order of 50% of all working-class houses (middle-class housing is usually too diffuse to be a good target) in all towns of over 50,000 population in Germany should be destroyed

if the United Kingdom concentrated its effort on the production of bombers and on their use for this purpose. The Cabinet Office paper concluded that this strategy was the best one available to give the maximum help to the sorely tried Russian armies.

This paper came to the Admiralty and was passed on to me for comment. My reply was that the *method* of calculation used was correct in principle, but that the actual numerical answer, that of number of houses which could be destroyed within eighteen months, was six times too high. The main mistake in the calculation was that it was assumed that all bombers which would be delivered from the factories in the next eighteen months would *in the same* period have dropped all their bombs over Germany. It was forgotten that not only does at least six months, if not a year, elapse between the *production* of a bomber and the *completion* of the average 20 bombing missions which it makes during its active life; but also that to absorb into operational squadrons all the planned output of bombers in this period would need an increase of number of operational squadrons by a factor so large as to be quite unattainable owing to limited training facilities, etc. Sir Henry Tizard, to whom the Cabinet Office paper was also sent, came to roughly the same conclusions as I had, that is, that the paper exaggerated the probable effect of the bombing offensive between April 1942 and October 1943 by a factor of about 5 to 1. Subsequent history showed that we were both wrong. The actual factor of error was 10 to 1. By this time a certain allergy to arithmetic was spreading in Whitehall and our arithmetical forebodings went unheeded. The Air Ministry agreed with the Cabinet Office paper and the policy of making a major contribution to the Allied war effort, until the autumn of 1943, the dehousing by bombing of the German working class population, with the object of lowering her morale and will to fight, became official British policy.

The story goes that at that time in the Air Ministry it was said of anyone who added two and two and made four: "He is not to be trusted; he has been talking to Tizard and Blackett."

While this analysis and planning of the bombing offensive was in train the war at sea was going very badly. In the autumn of 1942 the U-boat war on our shipping was exceedingly menacing; the huge toll of shipping losses, up to 800,000 tons a month, unless rapidly checked, might make the invasion of Europe in 1943 or even 1944 impossible through lack of shipping. Since the high efficacy of long-range aircraft in escorting convoys and in patrolling the Bay of Biscay had been proved, and since a very large number of long-range bomber aircraft existed, the obvious course was to divert some of the bombers from bomber operations to anti-submarine operations. To be sure that the diversion would be a net gain to the Allied cause demanded a quantitative estimate of the comparative effectiveness of long-range aircraft when employed in the two alternative roles. Now the techniques of operational analysis were just what was required to furnish such a quantitative comparison: the analysis of the bombing offensive outlined above was clearly highly germane. Operational research memoranda from the Admiralty and from Coastal Command provided much of the ammunition for the stiff inter-departmental engagement during the winter months of 1942-43 and which led eventually to the temporary transfer of some squadrons



*(Official Photograph)*

Sea Rescue Aircraft, Old and New. Sea Otter and Dragonfly Helicopter over Malta





from Bomber Command to Coastal Command and their rapid and brilliantly successful re-training in a matter of weeks in an anti-U-boat role. Further, a large number of American Liberators (the finest long-range anti-submarine aircraft of the Second World War) were specifically and by special Presidential edict allocated to Coastal Command. The results were startling. By July 1943 the U-boat menace was virtually over and a large part of the decisive victory was due to the air campaign. The U-boats mastered, the necessary shipping was accumulated for the invasion of Europe in 1944. Some further details of the analysis of the air-sea war which led to this increase of air effort are given below in connection with the analysis of convoy size.

During the heat of the controversy over the proposal to transfer some bombers from Bomber to Coastal Command, a leading airman was goaded by the welter of statistics and calculations produced by the Operational Research Groups to remind scientists "that wars are won by weapons and not by slide rules." But in fact "slide rule strategy" had arrived to stay, and the name, given perhaps originally with some derision, remained to mark a record of appreciable achievement in the application of scientific method to war.

The critical shipping losses during the autumn of 1942, which led to the belated but decisive diversion of more long-range aircraft to Coastal Command, also stimulated a very important development of quite a different kind: this was the adoption by the Admiralty of the policy of sailing large convoys instead of small ones.

Looking back, I think we operational research workers at the Admiralty made a bad mistake in not realising as soon as the group was formed in the spring of 1942 the vital importance of working out a theory of the best size for a convoy. However, it was not until the late autumn that the problem became focused in our minds, largely through discussions that took place at the Prime Minister's fortnightly U-boat meetings. The problem arose as to what was the best division of our limiting shipbuilding resources between merchant ships and the anti-U-boat escort vessels. Every merchant vessel completed brought into the United Kingdom additional much needed goods: every escort vessel completed added to the protection of the convoys and so reduced their losses by U-boat attacks and so *saved* more ships and cargoes.

To make a quantitative comparison of the relative advantages of building escort vessels or merchant ships, one needed to know how many merchant vessels would be *saved*, that is not sunk, by each extra escort vessel protecting the convoys.

A detailed statistical analysis was begun of the losses of merchant vessels in convoy during the previous two years, with a view to making numerical estimates of the degree of protection afforded to a convoy by a given number of escort vessels under the conditions of U-boat attack then in progress. The analysis indicated that a convoy with nine escort vessels suffered, on the average, 25% less losses than one with only six escorts. From this result, taking into account the number of convoys run a year, the average size of the convoys and the number of escort vessels in use, it was possible to calculate that each additional escort vessel put into service could be expected to *save* between two and three merchant ships a year. The practical conclusion was definite. Provided the war was expected



to last a year or more, it paid to build more escort vessels at the expense of less merchant ships. This was an important result, but had not a decisive practical importance owing to the practical difficulty of changing the shipyards rapidly over from the building of merchant vessels to the building of escort vessels. As so often occurs also with the predictions of economic theory, the theoretically optimum production programme cannot be realised quickly in practice.

The next points analysed were the effect of the speed of convoys and the effect of air escort either by long-range aircraft from land bases or by carrier-borne aircraft. It was found from Admiralty statistics that a *fast* convoy with a speed of 9 knots suffered, on the average, only half the losses of a *slow* convoy of 7 knots; provided both had air escort. Further, air escort amounting to 8 hours a day decreased the losses of ships by one third. The explanation of these startling gains by speed and air cover lay clearly in the fact that the U-boats could only keep up with a fast convoy by cruising most of the 24 hours on the surface. But when they did this, they were liable to be spotted by aircraft and, even if not successfully attacked, were forced to submerge; their speed was then so low that they could not keep up with the convoy.

Nothing practical could be done quickly to increase the speed of Atlantic convoys, since the ships in them comprised all the available ships, gathered together from all seas of the world, and could not be replaced by faster ships in years. But a great deal could be done and done quickly by increasing the amount of air cover, since by the winter of 1942 the Allied output of long-range aircraft suitable for convoy escort was rising rapidly and but a very small fraction was allocated for this role; the vast majority were designed for and were then allocated to the bombing of Germany. From the figures on the effectiveness of air cover to the Atlantic convoys given above, it could be calculated that a long-range aircraft, such as a Liberator I, operating from Iceland and escorting the convoys in the middle of the Atlantic, *saved* at least half a dozen merchant ships in its service lifetime of some thirty flying sorties. If used for bombing Berlin, the same aircraft in its service life would drop less than 100 tons of bombs and kill not more than a couple of dozen enemy men, women, and children, and destroy a number of houses. No-one would dispute that the saving of six merchant vessels and their crews and cargoes was of incomparably more value to the Allied war effort than the killing of some two dozen enemy civilians, the destruction of a number of houses, and a certain very small effect on production.

The difficulty was to get the figures believed. But believed they eventually were—something of the Whitehall battle has already been described—and more long-range aircraft were made available to Coastal Command, with the already mentioned startling results.

Since it was by no means safe to rely only on the increase of air support to stop the crippling shipping losses of the autumn of 1942, an energetic search was made for some other measures which could be put into operation quickly. Detailed attention was given, therefore, to the organisational aspects of the Atlantic convoy system. Perhaps some alteration in the organisation of the convoys might conceivably improve the situation.

At that time, under the exigencies of a very critical situation, the organisation of convoys and their escort vessels was inevitably, to a considerable

extent, a matter of chance. But certain broad principles to govern their organisation has been laid down by the Admiralty. Generally speaking, large convoys were thought to be relatively dangerous and small convoys relatively safe. A convoy of 40 merchant vessels was considered about the best size and convoys of more than 60 ships were prohibited. As regards the required number of escort vessels for a convoy of given size, a rough and ready guide was provided by the long-standing  $3+N/10$  rule. This laid down a minimum of 3 escort vessels for a very small convoy, and one additional escort vessel for every 10 ships in the convoy. Thus a convoy of 20 ships ( $N=20$ ) would have 5 escorts and a convoy of 60 ships have 9 escorts. The implication of this rule, whose origin was never traced, was that this number of escort vessels would make convoys of different size equally safe, that is, that the same average percentage losses would be expected.

However, the Admiralty  $3+N/10$  rule could be shown to be not consistent with the view that small convoys were safer than large. For consider the alternative of running (a) 3 convoys of 20 ships, each with the 5 escorts given by the rule, and (b) one convoy of 60 ships with all the available 15 escorts. Clearly the large convoy, according to the rule, would be much safer. For the rule for a 60-ship convoy gave only 9 escorts as necessary for equal safety with the small convoys, whereas 15 would be available by pooling the three separate escort groups of 5 each.

When the actual records of ships lost in convoys of different size were looked into, it was found surprisingly that in the previous two years large convoys had suffered much smaller relative losses than small convoys. The figures were startling. Dividing convoys into those smaller and larger than 40 ships, it was found that the smaller convoys, with an average size of 32 ships, had suffered an average loss of 2.5%, whereas the large convoys with an average size of 54 ships had suffered only a loss of 1.1%. Thus large convoys appeared to be in fact over twice as safe as small convoys.

Though the statistics seemed quite reliable, the scientists in D.N.O.R. felt it necessary to make as sure as was humanly possible that large convoys were in fact safer than small ones before attempting to convince the Admiralty that their long-founded preference for small convoys was mistaken. After all, statistics can be in error—particularly through chance fluctuations of the relatively small number involved in such calculations. Perhaps the lower losses of the large convoys in the previous two years had been due to chance. We felt that if we could find a rational explanation of why large convoys should be safer than small ones, it would strengthen the case for a change of policy. So an intensive study of all available facts about the U-boat campaign against the convoys was undertaken. Of great use were the accounts of prisoners of war from sunken U-boats of the detailed tactics pursued by the U-boats in their "wolf-pack" attacks on the convoys. After several weeks of intensive research, analysis, and discussion, the following facts emerged. The chance that a given merchant ship would be sunk in any voyage depended on three factors: (a) the chance that the convoy in which it sailed would be sighted; (b) the chance that, having sighted the convoy, a U-boat would penetrate the screen of escort vessels around it; and (c) the chance that, when a U-boat had penetrated the screen the merchant ship would be sunk. It

was found: (a) that the chance of a convoy being sighted was nearly the same for large and small convoys; (b) that the chance that a U-boat would penetrate the screen depended only on the linear density of escorts, that is, on the number of escort vessels for each mile of perimeter to be defended; and (c) that when a U-boat did penetrate the screen, the number of merchant ships sunk was the same for both large and small convoys—simply because there were always more than enough targets. These facts taken together indicated that one would expect the same *absolute number* of ships to be sunk whatever the size of convoy, given the same linear escort strength, and thus the *percentage* of ships sunk to be inversely proportional to the size of the convoys. Hence the objective should be to reduce the number of convoys sighted by reducing the number of convoys run, the size of the convoys being increased so as to sail the same total number of ships.

This analysis convinced us that the Admiralty orders about the size of convoys should be altered. After some weeks of earnest argument the alterations to this order were made in the spring of 1943 and the average size of the Atlantic convoys gradually grew.

No detailed claims of results achieved could be made as so many other factors were changing in the Atlantic battle at the same time; in particular, the air effort was stepped up greatly. Since the battle was virtually won by the summer of 1943 the advantage of the change to large convoys could not be directly tested. But the policy of running large convoys with the resulting economy in escort vessels played an important part in facilitating the transfer of numbers of anti-submarine escort vessels from the Atlantic to support the invasion of Normandy in June 1944. Without the theory of the greater safety of large convoys, perhaps the risk of diversion of so many escort vessels would not have been taken. During the summer of 1944, the Admiralty gave publicity to the successful arrival of a convoy of 187 ships!

It was most unfortunate that we did not appreciate the advantage of large convoys much earlier. It is quite easy to calculate that had the policy of large convoys been adopted, say, in the spring of 1942 instead of the spring of 1943, the loss of merchant ship tonnage during this period would have been reduced by at least 20%, that is from the actual loss of about five million tons to about four million tons, giving a saving of a million tons of shipping or about two hundred ships in the period of a year. The problem at the optimum size of convoy was, in fact, one of considerable scientific difficulty and could only be tackled by a strong operational research group with access to all the relevant facts.

By the early summer of 1942 the operational research group at the Admiralty (D.N.O.R.) had grown to sufficient strength to tackle this complex problem successfully. However it did not occur to us till later in the year—there were many other problems demanding study—and then the problem forced itself on our notice through the study of the effectiveness of escort vessels. In this case, as in most of the important cases with which I had personal contact, the really vital problems were found by the operational research groups themselves rather than given to them to solve by the Service operational staffs.

P. M. S. BLACKETT

## CHAPTER X

### THE MIDDLE EAST—A STRATEGIC SURVEY

BY MAJOR-GENERAL L. O. LYNE

THE AREA known generally as the Middle East, that is to say the area which includes Egypt, Israel, Iraq, and Iran has played its part in world affairs from the earliest days of recorded civilisation. It is here that the great land mass of Europe and Asia is joined to Africa and where therefore the natural centre of communications between these continents lies. When, in the last century, a French engineer had the skill and vision to cut the Suez Canal across the 100 miles of desert separating the Mediterranean from the Red Sea, he increased greatly the importance of this territory. A new and far quicker sea route was opened up from Europe to India and the Far East.

It may be opportune here to recall that under the Suez Canal Convention of 1888, which is still in force, "the Canal shall always be free and open, in time of war as in time of peace, to every vessel of commerce or of war, without distinction of flag". The canal is at present the property of the French Compagnie Universelle du Canal Maritime de Suez under a concession granted in 1888 and due to end in 1968—after which the Canal will become Egyptian property. The British Government owns nearly half the shares and British shipping is by far the biggest customer.

British troops have been stationed in Egypt since they entered the country in 1882 at the request of the Egyptian authorities to suppress a revolt and safeguard the Canal. They remained by agreement with the Sultan of Turkey of whose Empire Egypt was part until the First World War when Egypt was declared a British Protectorate. In 1922 Egypt became an independent sovereign state with reservations affecting the security of communications of the British Empire and defence of the country against foreign aggression which continued to be a British responsibility. Agreement and discussion continued until in 1936 an Anglo-Egyptian treaty was signed which was to be effective for 20 years.

Its main provisions included:—

- (a) Evacuation of Egypt by the British, except the Canal Zone where British troops and airmen were to remain stationed.
- (b) Free movement of British forces in Egypt in the event of war, or a threat of war.
- (c) Britain to undertake the defence of the Suez Canal until the Egyptian army was in a position to ensure its defence.

The Second World War, in which Egypt remained neutral until 1945, delayed the fulfilment of the 1936 Treaty. There was also considerable delay due to the difficulty of moving the vast quantities of stores left over from the war, before the British troops withdrew into the Canal Zone after the war. The continued reminder of our occupation which the presence of British troops in Cairo gave to the populace undoubtedly made subsequent negotiations more difficult. Egypt continued to demand the

withdrawal of all British forces and the revision of the 1936 Treaty and in 1951 unilaterally denounced this Treaty and the Sudan Condominium Agreement.

The new régime in Egypt under General Neguib, despite inflammatory speeches by some of his more hot headed lieutenants, has on the whole shown a much more realistic, if not conciliatory, approach to these problems; indeed, it has recently been possible to reach agreement on the Sudan.

It is the purpose of this article to examine the strategical importance of the Canal Zone, whether it is essential and possible to retain British troops there and, if not, what alternative locations are available, and if the Canal Zone remains vital strategically what are the possibilities and implications of garrisoning it with an International Force.

In the First World War the danger to the Canal came from Turkish Forces with German stiffening and leadership. The air threat was negligible and the Mediterranean remained a comparatively safe sea lane for British shipping throughout the war. Though Turkish troops in a daring dash across the desert at one time reached the Canal, and indeed succeeded in closing it for several days, the difficulties of maintenance of the force made its defeat almost a foregone conclusion. The strategical importance of this area became abundantly clear as the war proceeded. Not only did the Canal itself provide direct sea communications with India and the Far East, but the dock facilities of Port Said and Suez enabled the whole area to be converted into a main base to feed the armies of General Allenby in Egypt and to offer a ready place of evacuation for many of the troops from Gallipoli. Alexandria gave the Royal Navy the very necessary harbour facilities in the Eastern Mediterranean.

The lessons learnt in the war of 1914-18 were to be repeated and emphasised in the Second World War under conditions which made the Canal Zone of even greater importance and posed new problems for its defence.

When Germany overran Europe and first Italy and then Japan joined the war on her side, it became evident that the danger of a German/Italian conquest of Egypt would not only give the Axis the vital communication centre of the Canal Zone and finally close down the Mediterranean, but would also mean the overrunning of the whole of the Middle East and the almost inevitable junction of German and Japanese forces. The danger came from two directions. A direct advance by Rommel's forces along the North African coastline or a break through the Russian Caucasian front by German troops and an advance through Iran and Iraq. It is interesting to remember that, after Dunkirk, on Mr. Churchill's orders, the only armoured division in England was sent to Egypt to help in the defence of the Middle East.

In the Second World War the importance of an anchorage properly protected from submarine or air attack had become of paramount importance if surface ships of the Royal Navy were still to operate continuously in any area such as the Eastern Mediterranean where the proximity of Italian naval forces operating from heavily defended bases was a continual threat. Alexandria, with the addition of certain semi-mobile equipment, filled this need and it was from here that our naval units were able to do such magnificent work in the Greek and Crete operations, and subsequently

in support of the Eighth Army's advance in North Africa and the reopening of the Mediterranean.

One result of the mechanisation of the army was the immense increase in the tonnage of heavy stores required for its operation and maintenance. Not only had docks to be able to deal expeditiously with great numbers of cargo ships of all sizes, but store depots, workshops, repair units where the heaviest engineering equipment was available and adequate communications to knit all these together were essential. Fortunately the Canal Zone was ideal for its purpose. The twin ports of Port Said and Suez provided all that was required by way of dock facilities. The immense base area, equivalent in size and the complexities of its problems to the largest peace time industrialised region, sprawled to the gates of Cairo itself, but has since the war withdrawn within the Canal Zone.

Let us be under no misapprehension. We have spent a vast amount of our restricted resources ever since the war on modernising and strengthening this vital base area. The value of the immovable equipment, such as airfields, roads, railways, water, electricity, repair shops, barracks, etc. runs into hundreds of millions of pounds.

We have already said that this is the natural communication centre between East and West and between Asia and Africa. It has also cable facilities to Europe and the Far East and Australia.

In the last war, with the immense advance of air power, the strategic importance of this area became of enhanced value. Not only were the aerodromes of the Canal Zone well placed for long distance bombing, but the base itself was centrally situated to supply and maintain forward airfields into North Africa or up into Iraq or Iran.

It can be said then that the Canal Zone has proved irreplaceable to the British Commonwealth as a nodal strategical point in two wars. Though the Canal itself is of great value in shortening our communications, if the Mediterranean is open to our shipping, it is for other reasons that we should be so reluctant to evacuate the area without due safeguards. Its position as a centre of communications, its naval and air facilities, and, above all, its suitability to handling vast quantities of heavy stores and its permanent installations make it unique.

What then of the future?

Whatever the peace moves of the new Russian régime may portend, it is against Russian aggression that the free world has oriented all its defences and must in the nature of things continue to do so until at least Russia has supplemented her words by deeds. Until this happens it is not warmongering but plain common sense to be prepared to meet all eventualities.

The first factor which strikes one when looking at the possible developments of a Third World War is the important part that would be played by Africa. Africa offers not only great reserves of men and material, but would also provide the firm base from which to hit back if in the initial stages our armies were forced back in Western Europe. It is from the Middle East base that we could best develop the air offensive against Russia. We need this base therefore not only to protect Africa from attack and invasion, but also for counter attack if necessary. This is an added reason for our maintenance of the Suez base. The other considerations which made it so important in the last two wars would of course still carry

equal weight. Though the defence from air attack of the Canal itself would be even more difficult and the whole area would certainly offer a fairly favourable target for atomic attack, this can probably be said of any main base; strong defences and energetic counter attack to destroy the enemy airfields would be the best antidote.

The Middle East certainly offers a glittering prize for Russian aggression. The oil resources are almost unlimited. An advance here would put Russian forces on the Mediterranean and the Persian Gulf and would sever our communications with the Far East. This would be a disaster for the Commonwealth and for the free world. From the Communist point of view, it would also have a further advantage. They would not be invading a highly industrialised area like Western Europe and so their armies would not immediately be faced with the visible evidence of a much higher standard of living. This is a factor always to be reckoned with. Some of us will remember the partial breakdown of discipline in the Red Army in Berlin in the early summer of 1945. This was probably mainly due to the sight of the many things denied the Russian soldier in his own country, which even battle scarred and starving Berlin had to offer.

Are there any other possible alternative sites if Egyptian nationalist feeling makes our retention of the Suez base impossible? Apart from the vast base installations that we should leave behind and the great cost of moving such stores and equipment as might be made mobile, the main requirements would be:—

- (a) Dock road and rail facilities able to handle large tonnages of the heaviest modern equipment.
- (b) A closed and defended harbour from which naval forces could operate.
- (c) Air landing grounds for fighters and bombers of all types.
- (d) First class communications, including a good cable system and powerful wireless installations.
- (e) Covered storage and living accommodation for the troops. High morale requires reasonable living conditions and amenities.
- (f) Workshops and repair shops for aircraft and armoured fighting and administrative vehicles and other equipment.

Some of these can only be provided by a suitable geographical site. Others would depend upon the expenditure of much money and material and a dangerous transitional period during construction would be inevitable. To give some idea of the magnitude of the task it may be mentioned that the present Canal base covers over 200 square miles of installations valued at £500 million. The great majority of these could not of course be moved.

The most attractive alternative site from some points of view would be Israel, though there are also considerable disadvantages. Haifa could possibly be extended to supply most of the port facilities required and the development of the Gulf of Aqaba would give a useful link with the Far East, though the shallow approaches would always militate against the full use of any port located here. Plans for development of the Negeb may well turn a barren desert into a well-watered and habitable area. The strategical position of a base in Israel would be on the right axis both for



the defence of Africa and the development of a counter offensive against Russia. It is indeed the only alternative to Suez that would enable those who held it to stretch out their covering forces towards the enemy without a very long preliminary land approach, or worse still a seaborne move. A most important factor in this connection is that pipelines could be run forward to supply forward airfields with the jet fuel which modern aircraft require in such quantities.

It would, however, be extremely difficult to fit in such a vast project with the plans already made for developing this over-populated territory, both agriculturally and industrially. Even more serious would be the repercussions from the hostility which any such move would rouse throughout the Arab world.

The possibility of a base further back in Kenya can be discounted. The purely administrative base planned there after the war to reduce the size of the Suez commitment has been abandoned. If East Africa is unsuitable as an administrative base it is still less likely to provide a suitable alternative to the Canal Zone.

What then of Tripoli and Cyrenaica? The port facilities are reasonable at Tripoli but indifferent at Benghazi and even the former is very easily blocked as we found in the last war. The main drawback is the distance from here to the vital Canal Zone. Defence of the land bridge into Africa would be much more difficult, and moreover the essential cover of air and ground troops as far to the East as possible would mean either a long approach over one indifferent road or a move by sea. Though at present the King of Libya is well disposed towards us, events of recent years throughout the Arab world would not encourage that confidence necessary for the vast effort required to build up a modern military base, even if the natural facilities were more favourable than they are.

There remains Cyprus as a possible alternative. Its present port and dock facilities are quite inadequate. This might of course be overcome here as elsewhere, not only by permanent building but by some such temporary expedient as the Mulberry harbours used for the Normandy landings. Apart from the political situation and the active campaign of a section of the population for union with Greece, there are many grave disadvantages to an island base, especially such a one as this on the flank of the probable line of advance of enemy forces.

None of these possible alternative sites can be considered as suitable alternatives to the Canal area, quite apart from the great cost of equipping one of them. They might, however, prove useful for housing in peace some of the troops and equipment necessary to maintain and develop the Suez base in war.

We must also remember the great value to us in peace of the Suez Canal area as a central location for our strategic reserve. The same facilities for handling and transportation of troops and equipment which makes it so valuable a base in war are equally necessary for the rapid use of reserves in peace. This argument, so far as a purely British force is concerned, certainly would not appeal to Egypt. But the same considerations hold for any Middle East Defence Force or other international arrangement.

This article is being written in April, just as the negotiations over the Canal base have opened. Much may have happened before its publication in October. This must at least seem certain. Though Britain, the U.S.A.,

and the Western Powers most concerned are agreed on all fundamental issues in the Middle East and are capable, in terms of military strength and industrial potential, of protecting the Middle East from aggression, we can retain our present position only at the expense of continued hostility and deteriorating relations with Egypt. No Egyptian political party or individual statesman could possibly ignore the present strong nationalist feeling and demands for British evacuation. Equally, the maintenance of this base is so important, not only to the British Commonwealth but to the whole free world that we could not agree to evacuation without adequate safeguards. Egypt herself carries a heavy responsibility to the other countries of the Arab League whose very existence may depend upon the continued strength and readiness of the Suez Canal Zone.

The essential conditions from our point of view are proper maintenance, periodical inspection, and probably continual manning by our own men of certain special installations. There must also be a simple plan for the immediate full manning of the base in an emergency. Troops for this purpose could conveniently come from Libya or Cyprus, some of them being flown in if necessary.

The three alternatives for manning the base in peace time seem to be :

(a) A United Nations Force which might well be linked to international control of the Canal itself. This is the ideal solution but could only become practical politics if the Russians showed real evidence of a change of heart.

(b) A Middle East Defence Force based on the N.A.T.O. pattern and including the U.S.A., Great Britain, and other Western nations, as well as Egypt and the Arab States. It seems doubtful whether Egypt will accept this to start with, though it may be the ultimate solution if Russia continues to threaten the world.

(c) An Arab League responsibility with or without British troops. It is probable that as the discussions develop upon the technical aspect of maintaining and developing the base, Egypt will appreciate more fully not only the great cost but also the number of technicians required. It is to be hoped that in this event some formula will be evolved to overcome the present intransigent attitude of the Egyptian Government that they will not consider future methods of co-operation till the last British soldier has been evacuated. A soldier of the calibre of General Neguib should certainly be alive to the implications here. It is clear that the other Arab States can contribute little technical assistance at this stage.

Apart from the danger of the collapse of the whole mechanism of the base in the event of British total evacuation and the complete handover to the Egyptians, this would then leave Egypt and Israel face to face once more and there might be a real danger of a recurrence of the fighting between them. Certainly Israel would look very askance at such a move.

Peace and prosperity in the Middle East depend upon a satisfactory solution of the Arab/Israeli dispute and a better understanding between their governments and peoples. Until this comes about the security of the Middle East will always be in jeopardy. It is a factor which must be kept continuously in mind during the negotiations over the future of the Suez base.

What then is the conclusion we reach? The Suez Canal Zone is vital as

a strategical area and main base, not only to the British Commonwealth, but to the whole free world. Its unique position as the centre of communications and gateway between Asia and Africa and between Europe and the Far East, coupled with its natural and developed facilities for naval, air, and military forces means that it is irreplaceable by any alternative base. Egyptian national feeling makes the handing over of much responsibility for the maintenance and development of this base to her in peace time an essential factor in our relationship with the Arab world; at the same time the international importance of this area makes it incumbent upon us to obtain safeguards to ensure that not only is the base properly maintained and developed in peace but that all plans are perfected for its immediate full manning in the event of the threat of war.

If bilateral arrangements are necessary with Egypt in the first instance, we should make international responsibility for the area our ultimate object.

L. O. LYNE

## CHAPTER XI

### SEA POWER AND THE AIRCRAFT CARRIER

AIR MARSHALL SIR R. SAUNDBY

THE COMING of the third dimension into warfare during the first half of the 20th century, with the development of aircraft and submarines, has profoundly modified the art and practice of war, and it is not surprising that its influence on the whole concept of sea power has been very great.

For centuries the doctrine of the battle fleet, as the main instrument of sea power, has served as the foundation of all maritime strategic and tactical thinking, and, when a doctrine has been in existence for so long, it almost usurps the status of a principle. If it should be questioned, distinguished authorities rally to its defence; and the hard experiences of war—bitter lessons driven home by failure and disaster—are usually needed before it is widely recognised that the old order has changed.

It is then necessary to refer back to the unchanging principles of war, and to reshape our doctrines in accordance with new conditions. This process may be, and indeed should be, accompanied by lively argument and controversy. The free play of ideas, stimulated by a new challenge, cannot but refresh and re-invigorate the whole field of military thought.

This is the situation to-day. The lessons of the last war, which we have now had time to assimilate, have forced us to realise that many of the old doctrines, valid in the days of two-dimensional warfare, are now misleading and even dangerous.

It is my purpose in this article to note some of the modifications which modern conditions have brought about in our traditional exercise of sea power and, in particular, to consider the rôle of the aircraft carrier in the present and the immediate future.

"The sea is a great highway," wrote Admiral Mahan\* more than sixty years ago, "over which men may pass in all directions, but on which some well-worn paths show that controlling reasons have led them to choose certain lines of travel rather than others. These lines of travel are called trade routes; and the reasons which have determined them are to be sought in the history of the world." Our island kingdom owes its wealth and its importance to the development of its oversea trade. In the pursuit of commerce our ships sailed into unknown seas, discovering new lands, pioneering new trade routes, and acquiring bases and harbours at key points all over the world. In this pursuit, almost as a side-line, we gained a vast maritime empire and, later, by a natural process of evolution, drifted into the position of *primus inter pares* among the nations of our great Commonwealth. Our whole strategic and economic position has become indissolubly linked with our oversea trade, and the security of our sea communications has, for a long time, been an essential condition of our continued existence.

It was in these circumstances that British sea power arose, for, to quote Mahan once more, "the necessity of a navy, in the restricted sense of the word, springs from the existence of a peaceful shipping, and disappears

\* The Influence of Sea Power upon History.

with it, except in the case of a nation which has aggressive tendencies, and keeps up a navy as a branch of the military establishment.”\*

A glance at the present world situation will show how true this statement is. The Commonwealth and the United States of America are both dependent, though in somewhat differing degrees, on sea communications, and we both maintain navies for the protection of our shipping. On the other hand the U.S.S.R. has virtually no overseas trade and, outside the Baltic and Black Seas, which no navy hostile to Russia could enter, has very little shipping to protect. The Russian navy, which largely consists of submarines, can therefore rightly be regarded as a “branch of the military establishment” and indeed it is officially categorized as a part of the Red Army. Similarly, Red China has not much overseas trade, apart from a certain amount of coastal shipping which is more of a convenience than a vital need, and what she has is mainly carried in foreign vessels. The strength of these two great land Powers is based on the European-Asiatic continental mass, and they are in no sense dependent on overseas lines of communication.

In the state of the world to-day it is permissible to infer, without being thought guilty of indiscretion or provocation, that the only threat of a major war is that of a conflict between the Free Nations and the Totalitarian Communist states that lie behind the Iron Curtain. Of course, I know very well that it is laid down in Marxist theory that the contradictions and strains believed to be inherent in the capitalist system are bound to bring about internecine war and the disintegration of the Free World. The late Mr. Stalin, in an article in the “Bolshevik” of October 2 last year, referred specifically to the three internal “contradictions” which are to destroy the capitalist world—between labour and capital, between colonials and “imperial” governments, and between the “imperial” governments themselves. He laid special emphasis on the probability and importance of the last of these three forms of conflict. But the history of the post-war years suggests that this view is likely to be no less mistaken than are many other Marxist tenets, and that the tendency is in fact all the other way. Faced with the threat to their way of life inherent in aggressive totalitarian Communism, the capitalist nations are banding themselves together as never before. They are pooling their defence efforts, extending economic aid to those in need of it, and in many ways abrogating their ancient national sovereignties in the over-riding interests of military and economic strength and the maintenance of world peace.

It is in this context that one must examine the tasks facing our sea power in the second half of the 20th century. The protection of sea communications in the Free World is vital to our survival, and in these days of three-dimensional warfare it must be the business of our navies to contribute all in their power towards that protection. I suggest that their rôle will be, in practice, the protection of convoys, mercantile and military, at sea, and the destruction of enemy submarines, at sea, by means of ship-borne aircraft, surface ships, and submarines.

A moment's reflection will show that this contribution is only a part, although a very important part, of the wider task of protecting sea communications. The danger from air attack on ports and docks, mine-laying from the air in their approaches, and large-scale air attacks on

• Ibid.

convoys, might well be more serious than that from the enemy's sea forces. Apart from mine-sweeping and local anti-aircraft protection by escorting vessels, the Navy can do little or nothing to guard against these dangers, which can be dealt with only by means of land-based air power. But they could easily become so serious as to demand the diversion of a large part of our total air effort to avert them.

It is clear that the responsibility for the protection of our sea communications must therefore be shared between the Navy and the Air Force, the primary responsibility of the Navy being the safety of our convoys at sea.

The threat to our convoys is a three-fold one—from the air, from surface warships, and from submarines.

Let us consider first the threat from the air. The history of the last war showed clearly that the control of sea areas close to the land is now exercised by land-based air power. No surface ships can operate in these areas except under the "umbrella" of friendly air power, and even submarines can enter such seas only at very considerable risk. We may therefore hope that the aircraft of our operational Commands at home and overseas, and those of our Allies and the Dominions, will be able to secure the safe passage of our convoys in the narrow waters round our shores and in the approaches to our ports, and on sea routes all over the world where they lie sufficiently close to our land-based air forces. But even so, there must remain great tracts of sea, across which our convoys must pass, which are far enough from land to make it unwise to rely wholly on protection by land-based aircraft. Additional protection can be given to our shipping in these wide ocean spaces by an escort of aircraft carriers and A.A. ships, which may be developed to operate guided missiles.

Attack from surface warships can, for all practical purposes, be ruled out in the areas controlled by our land-based air power. It is a possibility, however, in remote seas, and it might come from aircraft carriers, warships of all sizes armed with guns, and fast torpedo vessels. Against all these forms of attack the escort carrier, with its reconnaissance and strike aircraft and secondary gun armament for short-range engagements, can provide the best close defence available in the absence of land-based air forces.

But probably the most sustained and dangerous form of attack on our convoys will come from under-water craft. In both World Wars, enemy submarines were responsible for the overwhelming majority of our shipping losses. During the last war it was shown that aircraft carriers, co-operating with suitable small surface vessels, were able to give convoys a high degree of protection against U-boats. Modern developments in submarines, such as "snorts", higher under-water speeds, and improved torpedos have provided a new challenge, but there is not in sight any better way of giving local protection to our convoys than the employment of escort carriers with aircraft equipped with the most up-to-date radar devices. Indeed, the improved performance of the submarine makes the escort carrier and its aircraft more important than ever, since it is clear that the higher speeds of submerged submarines will make more difficult the task of our slower frigates and other escort vessels, on which we shall have to depend until they can be replaced.

Apart, therefore, from the operations of land-based aircraft, the principal defence against all three forms of attack is to be found in the escort carrier. These ships are a vital component of our sea power

at present and in the immediate future. Their importance is so great that it is natural to suppose that an enemy would concentrate his main efforts on their destruction, rather than against our merchant shipping itself. For if the escort carriers should be sunk, the convoys might, in certain circumstances, be at the mercy of all three forms of attack. It would therefore be sound policy to have a greater number of small carriers, provided that they were big enough to carry out their tasks efficiently, rather than a smaller number of large carriers.

It will be the duty of the land-based air forces to support the efforts of the Navy by long-distance offensive patrol over the sea, and by a bombing campaign against the enemy's ship-building potential and the ports and bases used by his sea and air forces engaged in the attack of our shipping. It may also be necessary to lay sea-mines from the air. The degree of effort allocated to these offensive tasks will, of course, depend upon the seriousness or otherwise of the situation at sea.

There has been a tendency during the last decade for naval writers to suggest that the large Fleet aircraft carrier will assume the rôle of the capital ships of the future. In order to appreciate what is involved in this suggestion, it is necessary to examine the idea underlying the term "capital ship".

In the old days of sail, the main unit of sea power was the line-of-battle ship, or ship-of-the-line as it was commonly called. The ship-of-the-line could be destroyed in battle only by ships of its own class, and it therefore feared nothing at sea except a more powerful fleet of ships-of-the-line. It was therefore convenient, in those days, to measure the sea power of any nation in terms of the number of ships-of-the-line at its disposal. During the 19th century the ships-of-the-line, with the gradual coming of steam propulsion, armour, and heavy long-range guns, greatly increased in size and power and came to be known as battleships, and later as capital ships. Up to and including the first World War they were regarded as the prime units of sea power, and naval strength was reckoned in terms of battleships.

But towards the end of the 19th century the invention of new weapons began to alter the picture. With the development of the sea mine and the self-propelled torpedo launched from small, fast, unarmoured vessels, the battleship became vulnerable to new threats. It no longer enjoyed the privilege of fearing nothing at sea but ships of its own class. It could be sunk or seriously damaged by weapons which had no need to penetrate its thick armour plate, but which could attack its thin under-water skin. The battleship soon found that its powerful armament of guns could not be relied upon to protect it against the high-speed torpedo-boat, capable of swift attack accompanied by a high degree of surprise and evasive action, followed by an equally swift retreat.

A squadron of battleships, therefore, could no longer plough the waves in secure and majestic solitude. It had to rely on screens of cruisers, torpedo-boat destroyers and mine-sweepers to protect it. Later, with the coming of aircraft and submarines, the battleship was menaced by attacks from unseen enemies above the clouds or beneath the waves. It could be surprised and sunk without having a chance to defend itself. Its only remedy was to redouble its defensive screen of cruisers and destroyers, and to enlist the aid of aircraft carriers equipped with fighters and torpedo-bombers. In addition, in an attempt to guard against air attack, the



battleship had to armour its decks and provide itself with powerful batteries of heavy and light A.A. guns.

Its enemies had multiplied so grievously that a squadron of half-a-dozen battleships could not put to sea without an ancillary fleet of fifty or more other warships to protect it. By the beginning of the second World War even this defensive array proved insufficient when within range of land-based enemy air forces, and the Fleet could operate only under cover of superior air power.

In these circumstances, it was natural to wonder whether the battleship was still the prime unit of sea power and, if not, what other type of warship had taken its place.

The battleship had always been regarded as indispensable by naval writers on the ground that if any other nation had battleships we must have them too, and more of them, since they could be dealt with in battle only by ships of their own class. As a result of this assumption we maintained until World War I what we called the "Two-Power Standard," which meant that we aimed to possess as many battleships as any combination of two other naval Powers. Although by 1918 the assumption that only battleships could deal with battleships was demonstrably no longer true, we had to wait for the experiences of World War II before it was generally admitted that we could safely rely on other and less expensive methods of destroying them.

In the last war most of the German heavy ships were destroyed or put out of action by means of air power. The *Bismarck* was sunk by our capital ships, but only after it had been disabled by a hit in the stern from a torpedo launched by a carrier-borne aircraft. The pocket battleship *Graf Spee* was scuttled by her own crew in the estuary of the River Plate after an action with three British light cruisers. For the rest, the *Tirpitz*, the *Gneisenau* and the pocket battleships *Admiral Scheer* and *Lutzow* were destroyed by air power alone. The *Scharnhorst* was kept out of action for nearly three years by air power, and on its first re-appearance at sea was sunk by the battleship *Duke of York* assisted by a number of cruisers and destroyers, while it was attempting to interfere with a convoy bound for North Russia. Since the war the offensive power of aircraft has substantially increased and it would seem safe, therefore, in future to rely on the ability of our land-based air power and, in some circumstances, on our ship-borne aircraft, to deal with any heavy ships which an enemy might seek to employ against our sea communications.

It seems possible that the idea that the aircraft carrier would become the capital ship of the future originated in the sea battles between the Americans and the Japanese in the Pacific during the last war. These battles were decided, except in one accidental encounter, by means of air attacks launched from the carriers long before the heavy ships came within sight of each other and had a chance to fire their guns. The Japanese, when their ship-borne air strength was crippled by their carriers being sunk or damaged, had to withdraw their sea forces and lost the freedom of naval action which they had enjoyed since their attack on Pearl Harbour. It is not unnatural that these events should have encouraged a belief that, although the battleship was obsolete, its place as the capital ship—the prime unit of sea power—has to-day been taken by the aircraft carrier.

But if we look more closely at the lessons of the last war, we can see that it is not only the battleship, but the whole idea of the capital ship, that is obsolete. We have seen that the task of the Royal Navy, in concert with the sea forces of the North Atlantic Treaty Powers, will be anti-submarine warfare at sea and convoy escort. For these duties it must have escort carriers, anti-aircraft and fast anti-submarine vessels, but it is impossible to see in what way the capital ship can come into the picture. There is no longer any need for a battle fleet. Its task as the traditional backbone of sea power—the supreme weapon that could be relied upon to deal with an enemy's heavy ships—has been taken by land-based air power. It is no longer true that, if a potential enemy were to build capital ships in the form of aircraft carriers or any other powerful warship, we must have similar capital ships ourselves in order to deal with them.

My conclusion, therefore, is that there is no case for building fleet aircraft carriers to serve as the capital ships of the future.

It will have been noted that the tasks confronting sea power, under modern conditions, are strategically defensive in character. It has, however, been claimed that the coming of three-dimensional warfare has conferred on sea forces a new offensive power, and that the large fast aircraft carrier, capable of launching long-range bombers armed with the atomic bomb, will have a useful rôle in the future. It is argued that such mobile air bases might enable atomic bombers to reach targets of vital importance now beyond the range of land-based air forces. It is, no doubt, for some such purpose that the American 60,000 ton aircraft carrier *Forrestal* and her sister ships are now being built.

But are there, nowadays, any such targets? Modern jet bombers have a very large radius of action and, if necessary, this can be increased by means of refuelling in flight. It is difficult to think of any part of the world which would be beyond the reach of the long-range bombers of the North Atlantic Treaty Powers.

If, however, we admit for the sake of argument that there may be some vital targets beyond the range of land-based bombers, what chance would the big carrier have of getting unobserved to the take-off point, remaining thereabouts until its bombers had returned and landed on, and effecting a safe withdrawal?

It is, of course, always possible in war to pull off a surprise attack of this kind. But it can hardly be doubted that an enemy would quickly appreciate that the attack had a sea-borne origin, and it would be no difficult matter to follow the retreating bombers, keeping in radar touch, back to their parent ship. As soon as she had been located and reported, wave after wave of land-based bombers and torpedo-carrying aircraft could be sent against her, and her chances of survival would be infinitesimal.

It is sometimes contended that, as these ships would have a very high speed, 35 knots or even more, they might prove to be difficult moving targets and could effect a swift withdrawal once their aircraft had returned. I do not think that it is always realised that, compared to an aircraft cruising at 450 knots, the speed of the fastest ship is so low that for all practical purposes it can be regarded as stationary. Nor could a ship of 60,000 tons be expected to indulge in very sprightly evasive action. It seems to me that such a ship might, with careful planning and very

good luck, carry out an attack of this nature once and get away with it, but it could not expect to repeat it very often, if at all.

It has been suggested that these great ships could carry a sufficient number of fighters and guns to give them local air superiority and thus protect them against full-scale air attack. Those who support this point of view are wont to point out that, during the last war, no British carrier, equipped with its full complement of fighters, was sunk or even seriously damaged by land-based air attack. This seems to me to be a dangerously optimistic point of view.

The number of fighters that can be put into the air, the number of guns, and especially the supply of ammunition that can be carried by even the largest ship is definitely limited. Such a ship must always be liable to be overwhelmed and fought to a standstill by sustained and relatively unlimited land-based air attack. While it is true that none of our carriers was sunk by land-based air attack during World War II, this happy state of affairs had little to do with their powers of defence. It was due to a number of other good reasons. First, we were careful to avoid exposing our carriers to this risk and limited their operations accordingly. We hardly ever sent our carriers within range of land-based air attack for the purpose of launching bombers against enemy territory. On the few occasions when we did take a chance, such as the surprise attack on the naval base at Taranto or the forcing of convoys through the Western Mediterranean for the relief of Malta, we were opposed by the Italians, whose morale was low and whose equipment and technique were comparatively primitive. Even so, the Malta convoys were dangerous and even desperate missions, undertaken only to alleviate a desperate situation. Further, our carrier operations never seriously hurt or threatened the Axis Powers, and they therefore had no very compelling reason to seek their destruction. And last, but not least, Italian air power was broken from early 1943 onwards, while the German Air Force had more than it could do to defend the home-land against air attack, and provide support for the hard-pressed land forces on the Eastern front. By the time we came to invade the continent of Europe, German air power was also broken, and we possessed almost total air superiority in the West. It would be rash indeed to count on carriers, engaged in launching bomber attacks against vital enemy targets, enjoying a similar immunity in a future war.

We must also be careful not to fall into the error of thinking that, because our aircraft carriers can steam up and down the coasts of Korea in perfect safety, we would be able to do the same thing in a major war. The conflict in Korea is a limited one, and both sides have imposed on themselves political restrictions with the object of preventing the war from spreading. As Major de Seversky says in his latest book: "At this time our Japanese bases are still unmolested; our supporting sea forces are unchallenged by submarines or air action; our aircraft carriers are allowed to operate in surrounding waters, although they could approach neither Europe nor Japan in the last war until opposing air power had been virtually eliminated."\*

This is true enough, and underlines the danger of drawing conclusions from a very special type of war, such as we have in Korea, and expecting them to apply to an unlimited conflict, such as a world war.

\* Air Power: Key to Survival.

To sum up, three possible ways of employing aircraft carriers in war have been suggested. The first and by far the most important is the task of providing local protection for ocean convoys and the prosecution, at sea, of anti-submarine warfare.

This is a task in which we have not always been as successful as we might have wished. In both World Wars our merchant shipping suffered terrible losses and, indeed, the situation was so bad in 1917 that we were brought within measurable distance of defeat. The reason for this is not far to seek. It was because those who directed and controlled our sea power at that time were still obsessed by the view that battle fleets were the beginning and end of sea power, and that the only thing that mattered was the destruction or neutralisation of the German High Seas Fleet. They still thought of the U-boat campaign against our shipping as an example of the *guerre de course*, irritating but not really dangerous. It took the severe lesson of 1917 to bring home to us the fact that, even if we defeated the High Seas Fleet, we might not win the war at sea. Even during the second World War we were still inclined to pay too much attention to the enemy's heavy ships, none of which ever did us much harm, and too little to the U-boat, the real menace to the security of our shipping.

It is to be hoped that we now realise that the main duty of the Royal Navy is the local defence of our shipping at sea, and that the wider task—the protection of our sea communications including the safety of our ports and docks—is a joint burden which must be shared between the Navy and the Air Force. Although it is probable that the development of air power will tend to increase the share of this burden borne by the Air Force, the Admiralty will need all the money they are likely to get if we are to have a sufficient number of escort carriers equipped with the right types of aircraft, enough fast frigates and other escort and A.A. vessels, and up-to-date mine sweepers. There is no case for spending money on carriers for the rôle of the capital ship, as there will be no requirement for such a thing in future.

With regard to the big fast carrier, capable of launching long-range bombers, this is not a naval requirement at all, nor has it anything to do with the exercise of sea power. The operations of such carriers would be an integral part of the strategic air offensive, and they would therefore come under the operational direction of the Air Ministry. But, as far as I am aware, the Air Ministry has not signified that such ships are a requirement. In the United States, where these big carriers are actually being built, I understand that the Air Force have stated that they are not required as a means of carrying out the strategic air offensive, and that they do not support the policy of spending money on such vessels.

Let us therefore concentrate on building our new Navy, designed and equipped to discharge its tasks as modified by the conditions of three-dimensional warfare. Its status has changed, but it has a part to play in the future which, though almost wholly defensive in character, is vital to our continued existence. Although the days of the battle fleet are over, the safety and prosperity of our country and the Commonwealth are no less dependent upon the security of sea communications than at any time since the dawn of our history.

R. SAUNDBY

## CHAPTER XII

### SEA POWER AND AIRCRAFT

THE BELIEF would seem to be spreading in England to-day that the decline of our sea power since 1939 is of very little significance to Britain's future, owing to the rise of her Air Power. At this year's Navy Estimates a Member of Parliament said that "sea power would cease to be essential to our survival when the majority of the world's commerce was carried by air, and sea lanes had no longer to be kept open." Many taxpayers, and some of their representatives in places of authority, seem only too eager to accept such a statement as a probable forecast, and lend their support to a general weakening of our sea defences accordingly. But, for reasons which must really be well known to almost everyone, a change-over which would enable air-freighters to replace the many millions of tons of shipping needed for British commerce could certainly not be made within the next few decades, if ever. Moreover, although airborne freight still only amounts to but a most minute fraction of the tonnage carried at sea, questions such as Air Traffic Control, and the construction (already needed) of civil aerodromes on agricultural land (which would certainly be ill-spared if we had to depend on air-freighters in war), are already urgent problems. What is the physical practicability of ever replacing any large proportion of our ship carrying-capacity in that way? Where is the wisdom of trying to do so in a country which possesses so many natural resources, and geographical advantages, favourable to the continuance of seaborne commerce? Even if, at some future date, the change became practicable, let us face the fact that at the present day we have as large a volume of seaborne trade as ever, the need for which is unlikely to be materially reduced in war for many years to come, and that this must continue to call for priority of defence on a very large scale, if we are to survive. German admirals in both world wars recognised that we were particularly vulnerable in this respect, and it is not likely that Russian admirals will have failed to appreciate the fact as well; the present composition and size of the Russian navy is as clear an indication of this as anything could be. Twice already, within 40 years, England has struggled in the throes of strangulation, because the provision made for the Navy was inadequate for ensuring the free and safe passage of merchant vessels in the face of war dangers. We have now even smaller naval forces than then at our disposal for the task.

It has also often been argued recently that England no longer needs strong surface ships, because (it is said) the late war proved that Air Power could do their work; large carriers as well as battleships should be scrapped! To illustrate this one commentator wrote in January this year "The Scharnhorst was kept out of action for nearly three years by air power, and sunk on its first appearance at sea by one of our capital ships. It seems safe to reckon in future on our air power being able to deal with any capital ships an enemy might seek to operate against our sea communications." Even if the whole of that statement was entirely justified, what, one

may well ask, would have happened to our North Russian and Atlantic convoys if that capital ship had not been there? But the premise is false. Actually the Scharnhorst reached the Atlantic twice before January 1941, undetected and undeterred by air power, and, after proceeding up the English Channel in January, 1942, under the noses of the sea and air organisation whose task it was to stop such events, made further operational sorties from Norway before the one when she was sunk by H.M.S. Duke of York and other Home Fleet ships. It is recorded that none of the many German warship and surface raiders which passed into the North Atlantic, round Scotland or Iceland, was ever brought to action through being first sighted at sea by any aircraft on patrol. Many, indeed, after carrying out their raids returned to Germany, also undetected by air patrols. For many causes which have not yet been altered, air reconnaissance, search, and attack at sea are quite liable to fail, and are, in many sea areas, still quite impracticable. Even had she been first sighted at sea by patrol aircraft, the Bismarck would, in fact, have run little if any risk of sinking by our land-based aircraft; had the Home Fleet (thanks to a carrier aircraft torpedo) not caught and sunk her, and had she escaped a further Ark Royal attack, she must have reached Brest. The last war by no means proved the heavy warship (carrier or otherwise) dead. Apart from the Deutschland, Scharnhorst, Hipper, Gneisenau, and Scheer, which between them sank about one quarter of a million tons of shipping and afterwards returned to Germany, the Tirpitz and Lutzow carried out several operational sorties in Norwegian waters before being sunk or damaged by air attack. The former ship joined the German naval forces in Norway in March, 1942, but was not successfully attacked until September, 1943, when British midget submarines reached her anchorage and put her out of action for six months. The following April, carrier aircraft attacked her successfully, and did so again three more times in July and August; in November, unable to move she became a R.A.F. heavy bomber target and, after several attempts on her, this stationary ship was finally sunk. This was described by the same writer as being "destroyed by air power alone"! The Lutzow is the unique case of our long-range aircraft (after being first warned by Intelligence) being successful in crippling a German warship at sea.

With what confidence, then, can we view the possibility of land-based Air Power being able, without the collaboration of carriers and heavy ships, to locate and sink the 20 powerful Russian cruisers, should they ever have the occasion to operate against our shipping? We should need all the strong ships we have, and more. But how does such an up-to-date country as Russia come to want cruisers, especially large ones? Possibly its rulers have had one look at Seversky's book "Victory through Air Power," and then turned to the pages of history for facts. That, it is indeed worth while to do, when wondering how the fallacious doctrine came to exist.

During the 1914 war, while still unreliable, the aeroplane was developed for reconnaissance, but not until later for ground attack on a serious scale. Even by the end of that war it played virtually no part in naval operations far from the coast. Tactical support was the basis of air development until the later days of the first world war when first Germany, and then the Allied Powers, began to extend aviation into a new field, namely, civil

air bombardment. This was, of course, the direct consequence of the aeroplane's increasing ability to by-pass the land and sea surface forces; it was seen that it could destroy life and property behind those barriers. From this arose the need to provide a "third-dimensional" zone of defence, with gun, rocket, balloon-barrage, and fighter cover. The two new functions for the military aeroplane quickly commended themselves to the popular imagination in England and other countries, and gave birth to the third fighting Services in those countries. *Ipso facto*, popular interest and support, from that date onwards, sanctioned the rather exclusive development of the two particular functions named above (bombing and defending civil targets) in the organisation, training, and equipment of the new Air Services.

At the outset, presumably fearing the consequences to civil defence and counter-attack policies from any diversion of "air" resources to the Navy and Army, the allocation of *all* "air" functions to the new Service was sanctioned. It may be noted that these developments did not take place in America or Japan at any time before the end of the second world war. This was the basic cause of the immense disparity in the technical development and operational effectiveness (especially in regard to total strength) between British sea aviation, on the one hand, and that of the United States and Japan on the other. In spite of the partial recovery of its aviation "independence" a few months before the beginning of World War II, so much ground had been lost by the British Navy during the preceeding 21 years, in practical experience, technical development, training, indoctrination, and, above all, the continuous responsibility for the direction of those matters, that it was most dangerously handicapped during almost the whole of the late war, and is still a long way behind in many directions.

Thus, unfortunately for us, a country obliged to depend upon the sea for its survival in war, there are many respects in which progress in sea-defence technique and equipment has lagged behind the needs of co-ordinated defence, while at the same time the value of sea power is being questioned and even deprecated upon grounds which, to say the least of it, are questionable and unproven. There is thus a pressing need to dispel the confusion of thought on this matter which so much mis-information has generated, especially as the pattern of rising Russian sea power becomes apparent.

#### THE STRATEGICAL NEEDS OF BRITISH SEA POWER TODAY

Membership of the North Atlantic Treaty Organisation has not diminished Britain's need for sea power, any more than the advent of flying has done. From the British angle this problem is more difficult than that which we faced during World War II for two reasons; first, that the maintenance (by sea communication) of large supplies for all the countries of Western Europe, instead of merely for the British, would now be needed; and secondly, that a large proportion of these supplies would have to be brought nearer to enemy naval and air bases than if, as in the last war, Britain alone needed them. The fact that the combined naval forces are greater than the British alone is more than offset by the greater proportions of the task; in other words, the British Fleet (in the widest sense of that word) under N.A.T.O. will have more to do than it







would if merely defending its own shipping, unless a very large proportion of the work is done by the United States Navy. Conditions elsewhere might well not allow that to happen. In any event, the tasks to be done by our Navy would be of much the same type in either case.

But our naval responsibilities do not, by any means, end there. Much British shipping passes on routes which do not lie within the sphere of operations likely to limit our N.A.T.O. colleagues' naval activities; these are the long sea routes which join Great Britain with South America, the East Indies, Australia, and New Zealand, and with the Middle East, East Africa, and India. A much higher concentration of danger from submarine and air would be expected in the areas to the northward of the Azores, than elsewhere in the Atlantic and Indian Oceans; but, because of the gravely insufficient numbers of our warships and seaborne aircraft, and the far fewer, and proportionately less effectual though costly, shore air bases, those wider areas lend themselves very satisfactorily to the operations of the roving enemy corsair, be he either disguised or in full war paint. These circumstances tend to divide British spheres of naval interest into two general areas, the European Atlantic, if one may use such an expression to cover the former area described above, and the Ocean Trade Route areas; special features of each area are illustrated on the first two maps here adjoined. Should the calamity of another world war befall us, it seems now probable that the most intensive danger, particularly in the European Atlantic zone, would again come from the submarine. The other less serious dangers, which in World War II nevertheless accounted for heavy Allied shipping losses and could be repeated again at least as effectively, were:

- (i) the mine, laid by aircraft, submarine, or ship;
- (ii) surface raiders, both warship and disguised; and
- (iii) direct air attack.

The conditions which might be expected to exist in the early stages of another such war, could well conform quite closely to those of the first two years of the last, while our available naval and (maritime) air forces are considerably smaller than the same conditions would now demand. On the other hand, jet aircraft technique has greatly increased the speed, range, and load-carrying capacity of bombers, while Russia, if not encumbered by commitments on an Eastern front, as Germany was, might concentrate more than the latter could on the air attack of shipping. Comparative figures of the Allied shipping losses from these causes during 1939 and 1940 may therefore be of interest.

<i>Cause of loss</i>	<i>Approximate numbers of ships sunk during 1939/40</i>				
(1) Submarine .. .. .	..	..	..	..	1110
(2) Mine .. .. .	..	..	..	..	350
(3) Surface ship attack at sea..	..	..	..	..	240
(4) Air attack (sea and harbour)	..	..	..	..	100

#### THE EUROPEAN ATLANTIC AREA

For Map 1, the assumption is made that there has been no advance by Russia across the East German frontier, nor into Finland. Arcs for the operational limits of 500 and 1,000 sea miles, for Russian land-based

aircraft (Russia is said to have no carriers) flying from western Soviet territory, are shown. Flights to the latter arc would obviously be a degree less effective than flights to the former limit; probably within the shorter limit, bombers could conduct mining operations, as did aircraft in the last war. On the assumption that the bombers were jet aircraft, interceptor fighters could normally only be used for defence of sea areas to the *westward* of the fighters' bases, and over a very limited range; consequently the sea areas defendable from shore fighter-bases by British and other N.A.T.O. land-based interceptors would be approximately as shown on the map. All other sea areas must be defended against jet aircraft, if at all, by carrier-based aircraft. When attacking submarines, in the face of modern standards of opposition, enjoy co-operation by their own reconnaissance aircraft they are many times more efficient than without it. It would therefore be expected that our enemy would fly long-range aircraft over the submarine operating areas, and, as fighters would therefore become a very necessary part of anti-submarine work, the limitations on the use of land-based air-defence against bombers for shipping would also apply here. Carrier fighters would again be necessary in most areas.

#### THE RAIDER AREAS (MAP 2)

With one exception all German surface raiders until the end of 1941 reached their operating areas in the Atlantic by passing east and north of Scotland and close north or south of Iceland. Though in doing this the Bismarck was sighted by a British cruiser, no others were sighted at sea by any ship, and none at all by aircraft, before their raids began. Most of them had considerable success over months of cruising, and few were ever sighted by warship or aircraft before their final destruction by the Navy or their return to Germany. Between them the raiders of this period sank more than one and a quarter million tons of shipping. The only Allied aircraft which made contact with them were from carriers or catapult-fitted warships. Map 2 shows the areas in which they operated, and it will be seen how they moved almost exclusively in the shipping zones which were clear of the practical range of shore-based air patrols. It is not very likely that, in the near future Allied, and particularly British, air-reconnaissance units at oversea shore-bases are going to be available for very much wider or more effective patrols than those shown, outside the North Atlantic area. These patrols barely overlap the fringes of the central ocean zones, across which shipping is nearly always bound to pass for economic and other vital reasons, e.g., to save voyage-time and to avoid submarine danger points.

A study of the exact conditions in which the German ships escaped observation, when leaving the North Sea for the Atlantic, makes it difficult to believe that similar sorties could not be made by any of the fast well-armed Russian cruisers, or suitably chosen disguised raiders which that country might wish to fit out for the purpose; the Pacific outlet would be an even more difficult one to stop. During their raids the Germans made great use of small seaplanes (having no aircraft carriers available) in finding their quarry, silencing their wireless (by tearing out the aerial with a towed hook) and evading interception by our warships; because we had but few searching aircraft, those ships had long lives and many were able to return to Germany. To-day we have far fewer warships to spare for





these particular tasks. Still fewer are the aircraft, in carrier or cruiser, now available but so essential for intercepting any aircraft-equipped enemy raider. The Armed Merchant cruiser cannot supply the lack; that myth was exploded in the last war, when so many were sunk, having, with one or two brilliant exceptions (e.g. Rawalpindi, and Jervis Bay), achieved virtually nothing. If enemy raiders again appear in those wide open spaces there will be no satisfactory answer but the provision of aircraft-carrying warships.

### OTHER STRATEGICAL NEEDS

Besides the paramount duty of providing protection for the continued flow of shipping, the Navy, whether as a part of the N.A.T.O. forces or in meeting any particular threat to our country alone, must fulfil two other functions in war; it must be able to counter an oversea invasion of England or other parts of the Commonwealth, and it must be able to support British and Commonwealth military and air forces in their overseas undertakings, and protect the special supply lines needed while doing so. Since Norman days, England has probably never been nearer invasion than in 1940; but even air bombing and parachutists did not enable the German Army to cross an uncommanded Channel. The United States Army's re-occupation of the Philippines by their assault at Leyte was almost turned into a disaster for them through the impending attack by the Japanese Main Fleet on the transports and light aircraft carriers at the landing beaches; but, helped by bad handling and bad communications in the Japanese naval forces, that disaster was prevented, only at the eleventh hour, by the intervention of a portion of the American Fleet coupled with action by American naval aircraft. There could hardly be a more striking illustration of the vital importance of strong naval surface and carrier forces for both of the functions of sea power referred to earlier in this paragraph. A study of the Pacific campaigns against Japan, rather than being of little future significance to the problems of modern war, as is claimed by certain "Air Power" enthusiasts, is of importance to all countries with vital maritime interests. Every event in that theatre of war emphasises, not the insignificance of strong naval forces, but the vital importance of not underestimating them. With suitable, which usually means close and therefore carrier-borne, air support strong naval surface forces must still be recognised as the most practicable means now existing of fulfilling many paramount warlike tasks.

### SUMMARY OF NAVAL STRATEGICAL ROLES

First is the protection of shipping, in the selected routes, against any danger likely to assault it, submarine, mine, raider, or direct air attack; second is the defeat of seaborne invasion; third, is the support of military operations. In the performance of these rôles, the action of aircraft, whether ship-borne or shore-based, is complementary to that of the ships. The use of aircraft in them does not automatically, as some declare, imply the necessity for abolishing warships (especially large ones); it usually, in fact, increases their effectiveness rather than the reverse. A bombarding battleship with air spotting is better than one without, but no experienced soldier would suggest that bomb-dropping near his beach-head is generally a better or more accurate method of "softening-up"



before his attack than heavy naval guns. A near disaster at Salerno, in the 1943 invasion of Italy, was only turned to victory by the arrival of the battleships *Warspite* and *Valiant*.

The need for aircraft is like the need for any other force, ship, weapon, or instrument in sea warfare; it provides a means of carrying out a part of a single plan. Unless confusion is to reign, there cannot be more than one strategy in sea warfare, and that is of course naval strategy. "Air Power," as a separate entity, does not come into it; what aircraft may achieve for Britain *at sea* is a contribution to Britain's sea power. The aircraft used in sea warfare, whether operated from a ship or the shore, can only therefore be regarded as a unit of naval power; a strategical unit, a part of a naval force, or a tactical unit by itself. All such aircraft are, for that reason as well as for essential economy of effort, needed to conform in the details of the naval plan, for even when, in some particular rôle, they may operate out of direct contact with other naval forces, their value to the nation can only be measured by their success as a part of the naval force as a whole.

In the years between the wars this truth was largely ignored, with the result that the naval requirements for shore-based aircraft were by no means always met by craft suitable in type, or numerically adequate. For example, in September, 1939, the R.A.F. aircraft available for North Sea reconnaissance (G.R. Ansons) had not even the endurance necessary for completely covering the relatively (even for 1939) short distance between Scotland and Norway, one of the most important stretches of sea in the whole of our naval strategy. The deficiency had many adverse and serious results. The fighters in our carriers at the beginning of the war, which were almost all biplanes, were of so out-of-date a design and so few in number (for example, between Italy's entry into the war in June, 1940, and September of that year, the otherwise strong Mediterranean Fleet possessed only 7 fighters, Gladiator biplanes, of which 4 were used in Malta for the defence of that Island fortress by R.A.F. officers), that in the operations, like Norway, near German air bases quite unnecessary and sometimes fatal risks had to be taken. In the Mediterranean in June, 1940, Admiral Cunningham's Fleet was virtually without any long-range air reconnaissance, and, for a great part of the year which followed, its operations against the Italian Fleet were very badly handicapped for that reason. The Home Fleet was little better off. It is difficult to imagine that such a state of affairs would have existed had there been in British councils before 1939, a true comprehension of the needs of naval aircraft such as was visible in American and Japanese policy between the wars. It is one of the purposes of this review to underline the vital importance to Britain of logically developing the Navy's air equipment; only thus can the protection and full use of our sea communications be assured.

#### AIRCRAFT IN A BALANCED FLEET

The word fleet is used to embrace all of the forces of sea power, and the "balanced fleet" is one in which heavy and light fighting ships, carriers, aircraft (both shipborne and shore-based) and coastal craft, are to be found in proportions appropriate to all forms of modern sea warfare; bases, whose deficiency would cripple the sea fighting units, must be included. One of the difficult problems of to-day is the balance between carriers and



Convair Sea-Dart, Twin-jet Seaplane Fighter can take-off on Retractable Skis



surface fighting ships, and between carrier-borne and land-based naval aircraft. Air developments are not the only factors in these problems. The present extended use of electronics and the modern revolution in weapon development have probably contributed as much to recent changes in the pattern of naval warfare, as have the rapid evolution of the aeroplane and its motive power. But, whereas in the 1914/18 war aircraft had little practical value to the Navy except for reconnaissance, to-day there is hardly a single kind of naval operation in which they do not normally play an important, if not vital, part. Hence, as far as administrative arrangements will allow, the aircraft side of naval armaments should not be allowed to remain segregated; we hope now to see it being wholly integrated into the naval service.

Over the past 40 years the names of many new fighting rôles have found their way into naval language; not only because of aircraft, but because also of submarines, radar, rocket-projectiles, and many other innovations, the cruiser searches, major fleet actions, and the like, have given way to new and different naval tactical problems. Thus, the old balance of the fleet has entirely altered, though the same strategical functions, in broad principle, remain; the fighting ships do not disappear but, thanks to these scientific developments, they must mostly be used in new and different ways, and the fleet action in the old sense is now unlikely to be the major determining factor in the defence of sea communications. Naval forces, instead of being concentrated in large fleets, are now distributed over wide areas; and though most of the recent war experience (Bismarck, Scharnhorst, and other naval fights) in all parts of the world has shown that the final decision in the disputed areas goes to the side with the strongest naval surface force, the gun itself is being replaced (by degrees) in such units by other and perhaps more powerful weapons of longer reach, among which the aeroplane is still the most important. The conditions and other, perhaps local, factors which determine what unit is the best to use for a task, may still, and often do, preclude the use of aircraft. In the area where the Scharnhorst was sunk by Admiral Fraser's ships, the employment of aircraft, and even of submarines, by either side was impossible owing to bad weather; the British victory was achieved by a battleship, the Duke of York, helped by cruisers and destroyers. This so impressed the German naval staff at the time (December, 1943), that they reported

“As in the past, the battleship has proved itself the backbone of naval operations and in the last resort, its superiority on the British side has proved the determining factor.”

#### AIRCRAFT IN THE DEFENCE OF SHIPPING

In trade protection operations, the exact nature of the enemy threats to be met is the primary consideration in the type of ship or aircraft chosen for use. For the purpose of examining their possible future incidence, they are here considered as follows:

- (i) Submarine threat,
- (ii) Mine threat,
- (iii) Threat of surface ship attack,

- (iv) Threat of direct air attack,
- (v) The need for security against enemy air or other reconnaissance,
- (vi) The threat of enemy advances to new sea and air bases.

The first four are arranged in the order of their gravity during the first two years of the late war; possibly it would also prove to be their order should a third world war take place. The last two are specially important because of their possible effect on all others; in the late war, the frequency and pressure of U-boat, raider, and direct air, attacks on shipping were greatly multiplied by Hitler's capture of the western ports and airfields. The attached maps (1 and 3) have been arranged to illustrate the practical use of aircraft in naval operations which might take place in the defence of North Atlantic shipping. They show, in general terms, the areas in which such threats might be applied, and broadly, how the strategical dispositions for meeting them might be made. They do not in any way purport to represent any staff plan. Shipping, coastal and inward or outward bound, between Cape Finisterre and (say) Trondheim, could clearly be attacked (even in the earliest stages of a war with Russia) under the above named forms of threat, thus:

- (i) Long-range submarines operating from N. Russian and perhaps Baltic ports. They could reach any part of the Atlantic.
- (ii) Aircraft mine-laying might be carried out with reasonable success by enemy aircraft up to 500 miles from their base. Other mine-laying could be done by submarines or fast ships.
- (iii) Fast heavy cruiser attack. Easily practicable from ice-free N. Russian ports, and, in certain conditions (see below), from the Baltic.
- (iv) Direct air attack. Probably more serious than in 1939/45; may even pay at over 1,000 miles from enemy air bases (Map 1).
- (v) Long-range air reconnaissance of convoys and warships, sometimes from great heights. Enemy would do this in conjunction with submarine or air attacks on shipping, or heavy cruiser raids.
- (vi) Enemy advances westward would give him new sea and air bases. But, as an exit from the Baltic, Denmark is the key position, and its capture (the easiest possibly of them all) would seem his most likely first objective, and would instantly increase every naval threat to our shipping.

#### THE NAVAL COUNTER-MEASURES

*Against submarines.* For detection, radar and Asdic may be used by ships; visual reconnaissance, radar, and sono-buoys by aircraft. For attack, depth charges and projector weapons, and sometimes mines by ship; and bombs, rockets, and depth charges by aircraft.

Large or small carriers, or shore-based aircraft, may be used according to the area (see Map 3), though when the latter are operated at over some 400 miles very large numbers have to be available at the base to make up for the "dead" distances flown and the length of perimeter, if the patrols are to be at all efficient. On the other hand such aircraft are larger and so can carry more men, weapons, and instruments, and on duties nearer home have better patrol endurance than carrier aircraft. The superiority of







carrier aircraft lies in the following—they are in closer touch with the local situation, they can reach an attack area very quickly, while concentration or reinforcement by other carrier aircraft can be rapid; they have more manoeuvrability in attack, and can speedily renew their armament. Finally, they can be used in areas out of reach of shore aircraft.

*Against mines, and minelaying.* The extinction of coastal lights, coastal ship and air patrols, and gun defences (as in the Thames and other estuaries) are among the antidotes. In general, defence against minelaying is difficult because it involves, if fast aircraft are used by the enemy, constant patrols for eastward areas like the North Sea, which is a more likely side of the coast than the west. If defensive aircraft await warnings on the ground in those areas, the attack is over before an interception can be made; minesweeping is now not always successful (with the modern types of mine). This is a case of prevention being better than cure; we should attack minelaying bases.

*Against surface ship attack.* Good air reconnaissance is a vital part of the defence, and may be done by strategical patrols, sweeps, and photographic flights to the bases and sortie channels. But often enough shipping losses are the first warning given that a raider is out. For counter attack, surface-ship hunting groups, carrier-borne strike aircraft, and sometimes land-based bombers, may be used, the areas being again dependent on distances from land-bases (as shown in the diagrams). Raiders will always choose conditions of weather, time, and route for their sorties which make shore-based long-range reconnaissance difficult, if not impossible. Most of the German raider sorties were so favoured in World War II. History, indeed, shows that some raiders will always get out somehow, and that they will always operate at our weakest spots for patrol, which now-a-days is outside shore-based air range (see Maps 2 and 3). Nor can it be expected that land-based (non-naval) bombers could make very effective attacks against surface ships; neither the aircraft themselves nor their crews' bombing technique are appropriate to ship attack. Here therefore carrier aircraft must ordinarily be used. Only the largest carriers (used singly), or groups of smaller ones, could provide enough aircraft for continuous deep searches as well as adequate striking forces, with fighter escort if the enemy has "air"; heavy ships with heavy weapons would be needed to protect the carriers and despatch the raider when crippled by air attacks.

When the Graf Spee was at large, in 1939, nine heavy-ship hunting groups were formed, but only five carriers were available for them, while the total of aircraft each carried was inadequate for proper search as well as attack. She was found by none of these groups and finally caught by a cruiser sweep.

*Against direct air attack* (Map 1). The danger from this threat is likely to be greater than in 1939/45. In fact, in the coastal belts and North Sea these attacks would be difficult to stop, except on those coasts where a fighter base lay between the shipping lane and the enemy bases, owing to the difficulty of intercepting jet bombers from the "off" side of their target. Elsewhere (apart from gun and rocket defences from the ground) it would be carrier fighters, or nothing! At present carrier fighters still have a rather inferior performance, but soon there will be little, if any difference between the quality of these and land-based fighters in that respect. On

the other hand carrier fighters have the great advantage that they can accompany convoys (or naval task forces) in a good position to intercept attacks. Most of the sea (see Map 3) is, therefore a carrier-fighter area, rather than a land-fighter area, for the defence of shipping. Carriers, of course, also enjoy the advantage of being self-contained Air Defence Control stations, and the distance from Briefing Room to Starting-up Point can be measured in feet. It will be seen that it would be more practical, also, to defend Mediterranean convoys by carrier-borne aircraft, than any based in North Africa, in the event of air attacks being made on them from airfields captured in the Balkans or in Turkey (see Map 3).

*Against enemy air reconnaissance.* The use of fighters for interception, and radar for warning, would generally follow the same lines as in the defence of ships against direct air attack. As in that task also, the use of carriers must be the pre-eminent, indeed almost the sole, source of fighter defence in the sea areas.

### THE OFFENSIVE USE OF NAVAL AIRCRAFT

Under this heading may be included attacks against enemy shipping, which it seems, in the event of a Russian war (as it was in the last) must necessarily be of the coastwise sort, designed to save inland transport; it would also include amphibious landing operations, and attacks against enemy shore targets. Some of these operations would lie outside the practical range of British land-based bombers and would therefore have to be carried out, as they often were in the late war, by aircraft flown from carriers. At present British carriers can only operate naval types of strike aircraft, whose value for attacking land targets would be best felt where precision, as opposed to the "area saturation" kind of attack, from a high level, was deemed important. The super-carriers under construction in the United States should be able to operate the bomber types of aircraft; possibly aircraft capable of carrying the heavier types of bomb will soon be able to fly from our newest carriers. Apart from such attack rôles our carrier pilots are trained in army air support rôles, while on occasion they could provide fighter escort for land-based bomber raids on the enemy targets outside the range of R.A.F. fighters. In attacks against enemy shipping, in amphibious assaults, and in providing tactical air support for an army (as in Korea to-day) the Navy can use its heavy single-seat strike aircraft with very good effect.

### THE AIRCRAFT AND THE CARRIERS

The largest British class, the Fleet carrier, is needed for the operation of the aircraft whose uses have been above described, namely, the all-weather fighter, the heavy strike, and, possibly, a type of medium bomber. The next in size are the modern Light Fleet carriers, which can carry the same aircraft, but fewer of them. Such ships will be needed for all Task Forces in zones likely to receive much air attention from the enemy, for important convoys in threatened areas, and for most offensive tasks near enemy shores. If they are not available to the Navy, we may have to abandon many vital trusts and possessions to the mercy of enemy attack.

A third category includes the older Light Fleet carriers and the (converted merchant ship) escort carriers; they would be depended upon for

convoy protection in less seriously threatened (by air or surface attack) areas, though only a very few convoys would at present be lucky enough to get them and they take some time to build! From them, specialised anti-submarine aircraft, and the smaller types of jet (day) fighter, needed in convoy for protection against air attack and against the air-consorts of enemy submarines, can be operated.

The final class of aircraft-carrying ship is the even smaller Merchant Aircraft Carrier type of ship, used in the last war to help convoys with three or four small aircraft, and also carry a cargo of grain or oil; single aircraft-carrying ships (for seaplanes or helicopters) which may well be needed in large numbers for convoys on the long sea lanes outside air-threatened areas, can also be included in this group.

The operational merits of the aircraft carrier (in almost any form) are considerable; she can enable aircraft to be used at sea in places where aircraft could not otherwise be used at all, thereby greatly increasing both the offensive power and the security of a naval unit. The successes of most of the German raiders was due largely to their recognition of this advantage, even when the aid of very small floatplanes, operated solely with the help of cargo derricks, was alone available to the disguised ships; this success was augmented in some measure by "un-air-mindedness" in the Navy whose trade route cruisers were often without aircraft at all, while others sometimes took very little advantage of them.

The carrier can also provide by far the quickest and most economical means of transferring a strong potential of air defence, or assault, from one region to another where the sea will allow, which is in fact in most strategically important parts of the world. This ability is due to her high degree of mobility as an entirely complete operational air base. The long direct flights from land bases recommended by many pure "Air Power" enthusiasts, present many impediments to efficiency, economy, and effectiveness, among which are, of course, loss of operational load for fuel, vulnerability during the long flight, and navigational problems.

The carrier's "sinkability" is probably her weakest quality, but even that is usually overestimated, mainly because of exaggerated claims of bombing accuracy; for a start, a carrier at sea, like a battleship, is by no means easy to find with land-based aircraft, as war experience showed many an airman. The aircraft accompanying a fleet or task force, being in nearer contact, find their enemy much more easily (vide American and Japanese Pacific operations); and that is when their vulnerability counts most. Moreover, *even when found*, no ship is easy to hit from heavy bombers who fly high, and lack manoeuvrability; the carrier force of (say) four in company, normally used in areas of likely attack, can provide itself with the most effective air cover. The land air base is unquestionably easier to locate being immobile, and somewhat easier to damage, especially in regard to its grounded aircraft and large buildings. British, as opposed to American, Fleet carriers *all survived* the only accurate air assaults they received during the late war (which were of course almost entirely diving attacks), through having deck armour that resisted the necessarily low-velocity bombs, and saved them from fatal fires and vital hull damage.

What then are our conclusions as to the part of aircraft in sea warfare? First, that they are an intimately close and essential part of a fleet, and they must be integrated with it. Secondly, their individual rôles in sea warfare

demand technical characteristics which differentiate them very widely from their counterparts used in land warfare (especially in the case of carrier-operated aircraft); the training of their crews has to be correspondingly specialised. Thirdly, the sea areas where land-based naval aircraft can be satisfactorily used are very circumscribed; therefore Britain, whether defending herself alone, or pulling her weight in a United Nations struggle, must always be sure that her equipment of specialised naval aircraft, and the number of her carriers, are adequate for guarding her sea communications, and fulfilling her naval obligations elsewhere, in war.

“VOLAGE”

(Captain H. H. McWILLIAM, R.N.)

## CHAPTER XIII

### FOREIGN NAVIES

THE GENERAL political temperature throughout the world has remained about as high in 1952 as it had done in the preceding three or four years, and has in consequence allowed no run-down in the general course of naval preparedness amongst the more important navies of the world. A year ago it had been hoped that the "hot" war in Korea was on the point of extinction, but the break-down of the armistice talks during 1952 effectively removed any hopes there might have been for a cessation of hostilities. That one fact, revealing as it did the continuing difficulty of reaching agreement with the iron curtain nations, effectively maintained the need for a steady growth in naval strength among Western powers, and the general pace of naval re-armament has been continued throughout the year under review.

The new building under way for the more important foreign navies is still, on the whole, of modest dimensions and reflects the development of prototype ships of new design rather than a firm decision to augment navies by adding whole new classes of ship. Russia is a notable exception, having apparently decided on a current design for each type of ship and building ships to it on a squadron or flotilla basis, rather than singly. Most other nations, however, would seem to prefer extended trials of single examples before committing themselves to any sort of bulk building. This, of course, can be explained by the fact that most foreign navies, with the exception of Russia, have a large reserve of ships laid up which, though possibly obsolete, could yet quickly be brought into operation in the event of an emergency. Russia's emergence as a first-class naval power is too recent for her to have amassed any sizable reserve.

Russian naval policy has become much clearer now that the story of her mythical battleships has been cleared up. But the much-heralded increase in naval strength, and particularly in under-water strength, does not appear to have reached the targets set, although these were from the start impossibly high in regard to the known building capacity in that country. Nevertheless, no Russian building slip ever remains empty and a new keel is laid almost immediately after every launching. As a result, the Russian Navy is acquiring a steady stream of new ships, mainly cruisers, destroyers, and submarines. Difficult as it is to acquire accurate information from behind the iron curtain, there is enough slipping through to suggest that these new craft, with the possible exception of submarines, are robust enough and modern enough to prove formidable adversaries for similar ships in other navies. Some doubts have been expressed abroad as to the suitability of the new Russian submarines for modern warfare, and they are said to lack some of the technical aids for attack and defence which are now fitted as more or less standard equipment in the submarines of other naval powers. It would, however, be unwise to accept all these reports at their face value and more concrete evidence is required before any definite opinion can be expressed. On the other hand, it is certain

that a fairly large proportion of the present Russian submarine fleet is not even fitted with the Schnorkel, which certainly indicates a lag in essential modernisation for present-day underwater warfare techniques.

Technical development abroad, in countries other than Russia, is still mainly concerned with atomic power for ship propulsion, the guided missile as an assault weapon, and radar as the main method of warning for coming attack. Interest in the closed cycle hydrogen-peroxide engine for submarine propulsion would seem to be waning under the influence of three adverse factors: the technical difficulties of achieving a closed circuit in an internal combustion engine, the heavy cost of alternative sources of oxygen, and the progress of atomic research along ship propulsion lines. The closed cycle engine is, without doubt, a second best to atomic power in this respect, and the course of wisdom, no less than that of economy, dictates a pause to await the outcome of American experiments in this new medium. Any estimate of the directions in which Russian technical and scientific thought is progressing would be entirely guess-work in view of the strict control of press and broadcast in that country, but it is reasonable to assume that it is at least active along the lines mentioned above.

Naval building among the smaller navies of the world remains modest except in those countries where the American "off-shore" purchase arrangements have been made. In those nations the yards are busy with a variety of orders ranging from frigates to minesweepers and small patrol craft, amounting in all to some hundreds of millions of dollars. But for their own account, most of the smaller nations would seem to be content with modest orders for new ships and to be unwilling to commit themselves too far ahead in an age of such rapid scientific progress as prevails to-day.

#### UNITED STATES

The peak of naval appropriations was reached in 1951-52 with the staggering total of \$15,580,511,392. The figure recommended in the budget for 1952-53 is \$13,000,000,000, but this has to run the gauntlet of Congressional enquiry and scrutiny and, at the time of writing, the final amount has not been decided. In addition, the U.S. Navy shares to a certain degree in various research projects which are financed from other sources, so that the total expenditure on naval account is somewhat above this amount.

This great sum is required to finance new building, of which a considerable amount is under way, to maintain a vast fleet that totals no less than 4,800 craft of various types and a personnel that amounted to 820,000 officers and men in June, 1952, rising to 835,875 by June, 1953. The strength of the Marine Corps was 235,320 in June, 1952, and a year later was expected to total 243,730.

Of the total naval estimate, \$512,000,000 is allocated to new building, of which the main items consist of the keels of a second 60,000-ton aircraft carrier and a second nuclear submarine. Other new building during 1953, announced by Mr. Kimball, the former Secretary of the Navy, included an attack submarine, three destroyers, two ocean escorts, 30 minesweepers, two store ships, and 350 landing craft, while the conversions include two more of the Essex class carriers and two heavy cruisers.

The professional heads of the Navy remain unchanged, Admiral William Fechteler having held office as Chief of Naval Operations throughout the year. Admiral Arthur Radford, former Commander-in-Chief of the Pacific Fleet, has been already appointed the next chairman of the Joint Chiefs of Staff, a development through which the Navy hopes to benefit in the usual inter-service struggle for funds. The change of President in January, 1953, brought with it a complete sweep of the political heads, with Mr. Charles Wilson as the new Secretary of Defence and Mr. Robert B. Anderson the new Secretary of the Navy. From the purely expansionist point of view, this new switch from Democratic to Republican control is expected to benefit all the armed services, as a complaisant Congress is thought likely to ease their paths for the next year, in what is known in American politics as the "honeymoon" period. The bitter political struggle of the past two years, combined with an extremely critical Congress, had undoubtedly held up the smooth development of naval power since 1951, largely through last-minute budget cuts which frequently necessitated the postponement, or even abandonment, of agreed projects.

One of the main difficulties that has faced, and is still facing, the United States as a foremost naval power is that of bases. The official policy of the United States is to frown heavily on anything that smacks of Colonialism, though the Navy could wish for a rather more elastic policy in this respect, or at least the establishment of a wider form of protectorate which could provide the bases required. At the moment, the United States must rely on good relations with foreign countries, or some form of "lease", for many of her bases overseas. During the year under review, an agreement has been reached with Australia for the use of the base at Manus Island, which will at least solve one problem in the Pacific.

One alternative, as Mr. Whitehair, the former Under-Secretary of the Navy, pointed out in a speech in Washington, is the extended use of the fleet train. He referred to this as "the floating base", an optimistic description that does little to solve the major problem. A fleet train can replenish, it can undertake minor repairs, it can keep a fleet at sea for months instead of weeks, but it cannot carry with it all the services of a land base, or provide docking facilities in the event of major damage. However, the agreement with France for the use of Port Lyautey, and with Italy for the use of facilities at Naples, gives the U.S. Sixth Fleet a reasonable foothold in the Mediterranean, while persistent reports of negotiations in Spain for the use of possible naval bases in that country give grounds for belief that further bases in the Mediterranean and eastern Atlantic areas will be available.

The major place in American naval research continues to be occupied by problems of atomic weapons and means of propulsion. It was widely reported that two hydrogen bombs had been exploded last year at the Eniwetok testing grounds, and one eye-witness described the explosion, reporting that flames two miles wide had shot five miles into the air and had produced a temperature of 180° Fahrenheit at a point 30 miles distant. The United States Atomic Energy Commission, in reporting the successful conclusion of the trials, stated that they had included "experiments contributing to thermo-nuclear weapons research", which was widely accepted as confirmation of a hydrogen bomb explosion. The U.S. Navy, who contributed to Joint Task Force 132 in charge of the trials, is of course



vitaly concerned in the outcome of these experiments, and reports indicate than many useful lessons concerned with the protection of ships from atomic attack had been learned. After the tests, Mr. Gordon Dean, chairman of the Atomic Energy Commission, was at pains to emphasize that the hydrogen bomb "is now in the development stage rather than in the production phase."

These trials, of course, are an inter-Service commitment, equally important to the Army and Air Force as to the Navy. A similar project, also on the inter-Service level, is the gun to fire atomic shells of which official photographs were published during the year. It is designed in two models, one for purely land operations in which it is carried on a platform slung between two engine cabs, and one for fitting into a landing ship for amphibious operations. The gun, of 280 mm, weighs about 75 tons and has an elevation of 55 degrees. It is reported to be more accurate at long ranges than any other gun developed since the end of the war. The first atomic shell was successfully fired from this gun during the first half of this year.

On the purely naval side of atomic research is the construction of the submarine Nautilus, of which the keel was laid by President Truman on June 14, 1952. Just over a month later the Atomic Energy Commission reported that it had ordered an atomic power plant for "large naval vessels, such as aircraft carriers." The contract was awarded to the Westinghouse Electric Corporation, who are already building the installation which will be installed in the Nautilus. This contract can be linked up with the hint given by Mr. Kimball last year that the new 60,000 ton carriers would, before long, be given atomic propulsion.

Atomic energy has also been linked up with the research into guided missiles. Brigadier-General Herbert Roper, head of the armed forces "Special Weapons Project", stated in a hearing before a House of Representatives appropriations sub-committee that atomic warheads had been developed for guided missiles. Apart, however, from the question of types of warhead, concentrated research has continued on problems of rocket propulsion and the accurate ranging of these weapons during flight. Accounts in the press have purported to describe actual tests in which rockets have been successfully guided to small targets some hundreds of miles away, but such statements must obviously be taken with reserve. Control, of course, is electronic, and there should be no fundamental difficulty in guiding these missiles within the range of a normal radar installation. This, however, is limited, and it appears that present research is directed mainly on to the problem of enabling a rocket to leave one radar control and be taken on by another. This method of relaying, if it could be developed satisfactorily, would enable a guided missile to be controlled throughout the whole of its flight, even at ranges of many hundreds of miles.

During 1952, the U.S. Navy first used a type of "guided missile" operationally when some were fired from the aircraft carrier Boxer and directed against a concentration of anti-aircraft guns in North Korea some 150 miles away. In the despatch reporting the attack it was stated that the "missile" was catapulted from the flight deck and was guided in its initial climb by instruments in a Douglas attack aircraft. After it had reached its correct altitude, it was taken over by a similar aircraft, which

guided it while following at a discreet distance. The missile flew at several hundred miles an hour until it was over its objective, when it dived steeply on to its target. It is definite, however, that these were not missiles in the accepted sense of the word, but pilotless bombers developed from the British "Drone" and "Queen Bee" experiments of before the war.

The Secretary of the Navy, in his semi-annual report to the Secretary of Defence, stated that the time is fast approaching when guided missiles will be a major factor in the increased offensive and defensive capabilities of naval task forces and advanced bases. He also reported that the old gunnery training battleship Mississippi was being converted to take part in guided missile tests and evaluation programmes, and that the first provisional Marine guided-missile battalion had been formed and was based at the naval ordnance test station at Inyokern. In another part of his report he stated that "air defence guided missiles have been assigned the highest priority in order to ensure continued mobility of naval forces in the face of increasing enemy threats."

No reports have been received from the United States which can give any indication of the state of development of the closed cycle hydrogen-peroxide engine research. That it continues is perhaps indicated by the fact that construction of the experimental submarine designed to carry it has not yet been stopped. This is somewhat negative evidence, it is true, for it would be a simple matter to complete the boat with a normal diesel engine. It may well be that the project is being slowed down until results have been obtained in tests of the atomic-power submarine Nautilus.

The conversion programme of the remainder of the United States submarine fleet to "Guppy" propulsion continues apace and practically the whole of the Tench-Corsair class has now been converted, while considerable progress has been made on the remaining boats of the Balao class.

While a considerable volume of work and research is devoted to the improvement of the submarine itself, no less active has been the work and research given to anti-submarine methods. During 1952, the British anti-submarine frigate Rocket paid a three months visit to American waters to demonstrate weapons and devices developed on this side of the Atlantic. It was reported in several American newspapers that the British weapons created great surprise in the United States naval circles and were recognised as far in advance of similar weapons developed there. Other lines of anti-submarine research which have been mentioned are further improvements in the range and sensitivity of radar instruments, further developments of the Sonobuoy, and new types of depth charges for attack from the air.

The United States still retains its faith in the airship as a worth-while anti-submarine measure. Last year a new non-rigid airship was delivered to the naval air-station at Lakehurst. Said to be the biggest of its type ever built, it is 324 feet long and 35 feet high, and is engined to give it a speed of 80 knots. It can be maintained and repaired during flight and is designed for hunting submarines off the American seaboard.

The United States-Russian diplomatic battlefield was enlivened during 1952 by a curt request to Russia to return 186 of the 670 American

lend-lease ships still held by Russia. These ships are long overdue for return, but have been retained with the excuse that they are now of little value to the United States and of much more value to Russia. It has, however, been reported that this perennial request is now about to bear fruit and that at long last the Russians are prepared to discuss dates and ports for their return. All of these 186 ships are small warship types, consisting of 101 motor torpedo boats, 70 submarine chasers, and 15 landing craft.

The total strength of the United States Navy amounts to 15 battleships, two battle-cruisers, 36 fleet carriers, 66 escort carriers, 29 heavy cruisers, 43 light cruisers, 348 destroyers, 269 escort destroyers and frigates, 200 submarines, 219 minelayers and minesweepers, 148 patrol vessels, 950 amphibious craft, 675 fleet auxiliaries, and 1,800 service craft. Not all of this vast armada of 4,800 ships is, of course, in commission, but the active fleet alone is sufficiently impressive with a reported strength of four battleships, 19 fleet carriers, 10 escort carriers, 21 heavy and light cruisers, 340 destroyers and frigates, 100 submarines, and over 1,000 auxiliary and service craft.

During the year under review, several large-scale exercises have been carried out, both in conjunction with other N.A.T.O. navies and alone. An extensive amphibious exercise took place in the autumn of 1952, involving the landing of a marine division across a defended beach, and convoy exercises have been held in the Atlantic, Mediterranean, and Pacific. Trials have also been held in Arctic waters to test the general efficiency of various items of equipment and clothing and the general reaction of personnel to conditions of extreme cold.

### BATTLESHIPS

The Iowa, of 45,000 tons, has now joined her three sisters in active commission, and has been in action in North Korean waters, where she was employed in bombarding shore installations. The Missouri and Wisconsin are serving in the Atlantic, where the latter is used as a training ship. The New Jersey, the fourth ship of this class, is in the Pacific and has also seen action in Korean waters.

It has been reported that the battle-cruiser Hawaii, of the 27,500-ton Alaska class, is at last to be completed. Building was stopped on her when she was 82 per cent completed, and for some time there was talk of her conversion into a guided missile ship. She is now to be taken in hand for completion as a large tactical command ship, which entails the installation of a very extensive radar and communications equipment. It has been stated that, as such, she will carry nothing larger than 5-inch guns, although her two sisters are armed with nine 12-inch guns each and a large battery of close-range weapons. In her new role, the Hawaii is expected to be employed as a command ship for carrier task forces or other large groups.

No details have yet been released of the special equipment to be installed in the Mississippi, now being altered for use as an evaluation ship for guided-missile warfare. Presumably she will work in conjunction with the guided-missile ship Norton Sound, which has been experimenting

with "loons", the American counterpart of Hitler's V.1 weapon (the flying bomb) and with "Aerobees", which correspond to the original V.2 rocket. The Norton Sound is due at the end of this year off the northern coast of Norway where she will carry out experiments in atmospherical research. This entails shooting Viking rockets to a height of about 125 miles above the earth in order to study the phenomena caused by the Aurora Borealis. The tests are being carried out in co-operation with the Norwegian Navy.

The fifth ship of the Iowa class, the Kentucky, is still laid up in the Norfolk naval yard only 70 per cent completed. No work has been done on her during the year under review.

### AIRCRAFT CARRIERS

Building has progressed normally during the past year on the first of the giant aircraft carriers, the Forrestal. As yet there are few new details to be recorded about her since writing last year except that she is likely to incorporate the two British features of carrier construction which have found so much favour in American eyes, the angled deck and the steam catapult. One other report has stated that, on her flight deck with the bridge retracted, she will have three distinct launching areas which will enable her to fly off three aircraft simultaneously. There is a possibility that she may be ready for launching at the end of 1953 or early in 1954. She was laid down in July, 1952, and was expected to be completed within 29 months.

The 1952-53 naval appropriations included \$209,700,000 for a second flush deck carrier of 60,000 tons, and the former Secretary of the Navy had, in a previous speech, announced that plans were in hand to build one of these ships each year for the next ten years. It has also been announced that an atomic energy propulsion unit is being designed for an aircraft carrier, but whether it is for one of these giants is not yet certain. The second large carrier is being built at the New York Navy Yard, Brooklyn.

Work on the modernisation of the remaining ships of the original Essex class has continued throughout the year to bring them up to the standard of the improved Essex class, of which the Oriskany, completed in 1950, is the latest. Since last year the Intrepid, Ticonderoga, and Yorktown have been so converted, and two more of the class will be modernised this year. That will leave a further nine to be taken in hand over the next few years, as it has been announced that the whole of this class will eventually be reconditioned in this way. The modernisation calls for heavier decks, a smaller island, larger lifts, and handling gear to operate larger aircraft.

The Wasp, of the improved Essex class, was badly damaged during exercises in the Atlantic in April, 1952, when she was in collision with the destroyer Hobson. She had a 70-foot section of her bow torn away but reached New York in safety after a difficult trip. The damage was repaired by welding on a new bow. The Boxer, of the original Essex class, was slightly damaged in Korean waters during August of the same year, when a jet fighter exploded on board, setting fire to 12 other aircraft. She was withdrawn from operations and returned to Yokosuka naval base, in Japan, for repairs.

## CRUISERS

The Tactical Command Ship Northampton, launched in 1951, was completed last year and commissioned at the beginning of December. She began her life as a projected heavy cruiser of the Oregon City class, but the contract was cancelled when she was half built and she was completely re-designed. Although she carries 6-inch side armour and, in her hull and machinery, is a fully fledged heavy cruiser, she carries no more than four 5-inch guns in single turrets and eight 3-inch heavy A.A. in twins. Instead of a normal cruiser armament she carries a tremendous communications and radar installation to enable her to control the movements and operations of a task force at sea. She is fully air-conditioned throughout to enable her complement to endure extremes of temperature in comparative comfort.

Conversion of the two heavy cruisers Boston and Canberra into guided-missile cruisers is under way, but no reports have been yet received as to a possible date of completion. Both these cruisers are of the Baltimore class, of 13,600 tons, and it has been stated that five others of this class are to undergo extensive refit in order to incorporate improved rapid-firing 8-inch guns of a semi-automatic type.

## DESTROYERS, SUBMARINES, ETC.

The destroyer-leader Norfolk, launched in December, 1951, as a "hunter-killer" ship, is now reported in commission after satisfactory trials. Displacing 5,500 tons, she is the largest destroyer in the world. She is reputed to have a designed speed of 34 knots and to be of so robust a construction that she can keep at sea and carry out anti-submarine operations in the worst Atlantic weather. It has also been reported that she is to be temporarily withdrawn from service in order to incorporate some of the features of the British anti-submarine frigate Rocket. While this is a possibility, there has been no confirmation from official U.S. sources and she may well still be in full commission.

Similar ships, though rather smaller, are the four new Mitscher-class destroyers, which were also commissioned this year. It must be presumed that these are also "hunter-killers," since they, too, are fitted with extensive anti-submarine equipment. Their speed is given as over 30 knots and an official U.S. Navy announcement credits them with special engineering features not previously employed in ships of war, although these are not specified.

The 1952-53 programme allows for the building of four new destroyers, but no details of their construction has yet been announced. It seems probable that the design will be based on that of the Timmerman, which was built as the prototype of a new class and commissioned in 1951. This ship is said to have been very successful in her trials and the great saving in weight made by the extensive use of light-weight alloys in her engine-room fittings is a feature of her design. It had originally been reported that she was to be propelled by marine gas turbines, but she has, in fact, normal steam propulsion, though with the steam superheated to a much higher temperature than usual.

The year has seen a number of casualties among the ranks of U.S.

destroyers. The Hobson, of the 1,630-ton Ellyson class, which had been converted into a high-speed minesweeper, was rammed and sunk by the carrier Wasp during a night exercise on April 27, 1952. Loss of life was heavy, 176 of the total complement of 237 being drowned. The 2,200-ton Allen M. Sumner class destroyer Barton was mined in Korean waters during September, 1952, but she managed to reach Sasebo in Japan for repairs. The Cunningham, of the same class, was hit by shore batteries during a coastal bombardment and damaged, while the Coates, of the small Rudderow class (1,350 tons) was holed in a collision with the U.S. depot-ship Tidewater in Scottish waters.

The present submarine building programme in the United States presents many features of extreme interest, several different types being now on the stocks. Most important and revolutionary of all, of course, is the Nautilus, of which President Truman laid the keel on June 14, 1952, at Groton, Connecticut. In his speech at the ceremony, Mr. Truman said that the Nautilus would have a submerged speed of over 20 knots and that a few pounds of uranium would give her ample fuel to travel thousands of miles at top speed. She would, he said, also be able to stay underwater indefinitely, since her atomic engine would permit her to be completely free of the earth's atmosphere and she would not even require a breathing tube to the surface.

The engines of the Nautilus are being built by the Westinghouse Company and the contract was signed some time ago. Mr. Truman, in his speech, indicated that a full-scale working engine, complete in all respects, that would undergo thorough tests in a submarine hull on dry land at Arco, in Idaho, was in fact "almost complete right now". It was later reported that the partly constructed hull of the Ulva, one of the Balao class boats which was cancelled before completion, is to be used for this purpose.

The current building programme makes provision for the construction of a second nuclear-power submarine, and reports indicate that the engine will be of a different type. The contract for the propelling machinery was signed with the General Electric Company last year, but at the time of writing (March, 1952) there is no indication of any work having been started on the hull of the new boat.

The three "hunter-killer" submarines of 765 tons, numbered K1, K2, and K3, were completed and commissioned last year and are now in service. They are odd-looking submarines fitted with a large streamlined box on their bows which houses their special listening equipment. No details of their armament or performance on trials has yet been released, but it is known that they carry homing torpedos and that their electronic and asdic equipment is designed to enable them to ambush submerged submarines. Their full war complement is given as 45 to 47 men.

The six new boats of the Tang class have been coming forward through the year and all should by now be in service. These were specially designed for high underwater speed and are credited with 18 knots for a prolonged period submerged, though once again no official performance figures have been released. Some details of their new design of diesel engine were given in "Brassey's Annual" last year, and it has been reported that this engine gives more power than a normal diesel occupying twice

the space and of double the weight. These are fleet submarines of 1,600 tons, streamlined, and fitted with Schnorkels.

Due for completion this year is the Albacore, an experimental submarine for use as a high-speed underwater target. She will be of 1,200 tons displacement, but no other details have yet been made public. Smaller boats of the same general type are the two 250-ton submarines known as T1 and T2, both due this year. They will have a complement of 14 men and are described as small experimental coastal target and training submarines.

Less forward in construction are the two new radar picket boats, Sailfish and Salmon, which were included in last year's estimates. Both of these are still something of an unknown quality, and nothing but their projected names are known. Equally obscure is the progress, if any, of the Walther type closed-cycle boat, for which \$37,000,000 has been put aside. It would seem likely that this project is in abeyance, at least until the result of trials on the new Nautilus are known. Also on the projected list is a midget, known as X1 and with a designed displacement of 25 tons. She is described as a "submersible craft," so it may well be that she does not resemble the British X-craft, either in design or function.

For the rest, the normal Guppy conversion programme continues with submarines of the Tench and Balao class. The Tunny, of the 1,525-ton Gato class, has been taken in hand for conversion into a third guided-missile submarine, in which class she will join the already converted Cusk and Carbonero. These boats carry "Loon" missiles, which are stowed on deck in a water-tight steel hangar and are launched from a fixed ramp on the submarine's deck abaft the conning-tower. Three of the Tench class, one of the Balao, and six of the Gato, have been converted into radar picket submarines, and further similar conversions are projected.

The submarine Snapper was engaged, during the early spring of 1953, in a test designed partly to discover limits of human endurance in a submerged boat, and partly to determine how to control carbon dioxide in the submarine. She remained under water at Groton, in Connecticut, for a period of two months, with 23 men on board, and when they returned to the surface they all appeared to be in excellent health and spirits. The result of the carbon dioxide test was not made public.

Fifteen new tank-landing ships are under construction, the design being a modification of experimental craft built towards the end of the last war. They are diesel-driven ships of 2,439 tons and a overall length of 385 feet. Smaller landing craft of approximately 180 tons are also in production, and so far 38 of these have been ordered.

As in most other navies, the construction of mine-sweepers is proceeding apace. Two minesweeper depot-ships have been ordered, 18 more wooden minesweepers, and 50 minesweeping boats. These latter are small wooden-hulled boats of 30 tons, with specially shallow draft, and designed to sweep close inshore for amphibious operations. They are carried in parent ships and launched "on the site" to prepare the way for landing craft during an assault. They carry a complement of six men.

#### NAVAL AVIATION

The year has seen a steady increase in the Navy's air strength, while development of new types has proceeded apace. Several more speeches by senior naval officers have been made, all stressing the ability of carriers





The newest Commonwealth Navy. The Company of Motor Launch No. 3501, Royal Malayan Navy  
(Lieutenant Brittan, R.N., Captain)

(Official Photograph)



to handle atomic-bomb-carrying aircraft, and Mr. Kimball, the former Secretary of the Navy, in a speech at Athens, said that the 6th Fleet carriers in the Mediterranean had been equipped for this purpose. Admiral Fechteler, speaking in Manila, informed his hearers that the Navy could drop small atomic bombs in Korea, the first intimation of the existence of this type.

Of more immediate interest in naval aviation circles was the report last year that guided missiles had been successfully fired from the carrier Boxer during operations in North Korea. It subsequently transpired that these were not what is generally regarded as missiles, but robot planes controlled in flight by airborne radar. These were obsolete Grumman "Hellcats" carrying a bomb load of 2,000 lb., which could either be dived entire on to the target, or could be made to release their load over the target and then be guided back to base for replenishment.

During the year under review the U.S. Navy has adopted the British "probe and drogue" method of refuelling in the air. Connection between the tanker aircraft and that requiring fuel is made automatically when the pilot aims his probe nozzle into the drogue trailing from the tanker at the end of a hose. Disengagement is also automatic, made by the pilot reducing speed to below that of the tanker. The AJ1 Savage carrier-borne aircraft has been selected as a tanker and the first fighters to be fitted for aerial refuelling are the single-jet Grumman Panther and the twin-jet McDonnell Banshee.

Mr. Kimball, speaking at Los Angeles, confirmed that a United States Navy D.358 Skyrocket jet aircraft had been flown at a world record speed of 1,238 miles per hour, or almost double the speed of sound. The plane was flying at an altitude of 74,494 feet and had been launched from a B.29 bomber at about 30,000 feet. The Skyrocket has a turbo-jet engine, with a rocket engine added to provide the additional thrust required for supersonic flight. Its wings are swept back at an angle of 35 degrees. Its length is 40 feet, wing spread 25 feet, and its weight about 15,000 lb.

Some concern has been expressed in the United States about the apparent superiority of the Russian MIG 15 fighter over American fighters of comparative size and power. Admiral Fechteler, at a press conference in Tokyo during July, 1952, stated that the Navy had "in the works", two or three jet carrier-borne aircraft "as good as or better than" the MIG 15.

The U.S. Marines, who have their own air arm, have been equipped with the new Douglas EFF-3 Skynight, a twin-jet night fighter fitted with extensive radar equipment which not only directs fighters against hostile aircraft in darkness, but also controls the guns, bringing them to bear automatically and opening fire at a pre-determined range. The Skynight is reported to have reached a speed of 750 miles an hour while diving.

## FRANCE

The Navy Estimates for 1953 amounted to 175,000,000,000 francs, an increase of 25,000,000 francs over 1952. To this must be added a proportion of an additional joint expenditure of 93,000,000,000 francs for the three Services, as well as part of American aid expected to be in the neighbourhood of \$525,000,000. Even this is not the total, for United States "off-shore" purchases in French building yards amounted last

year to \$106,000,000, and most of the ships being built under this arrangement will certainly find their way into the French Navy, though a few are being built for other European navies.

It has been reported that the battleship *Richelieu* is to replace the cruiser *Emile Bertin* as a gunnery training ship at Toulon. She is the rather oddly gunned ship which mounts eight 15-inch guns in two quadruple turrets forward and nine 6-inch guns in three triple turrets aft. She thus has a vague resemblance to the former British *Rodney* and *Nelson*, though she is a far more handsome ship than they were. Work has begun on the raising of the battleship *Bretagne* at Mers-El-Kabir; she will be broken up for scrap when refloated.

The new anti-aircraft cruiser *De Grasse* is due to start her acceptance trials at the end of this year. She carries, together with other A/A armament both larger and smaller, 20 of the new 57-mm guns as specially designed for the battleship *Jean Bart*. These guns are said to be ultra-modern in design and are probably fully automatic and directly controlled by radar.

The first six of the 14 authorised *escorteurs rapides*, now known as *escorteurs de première classe*, are due for launching this year. These ships of 2,750 tons have a designed speed of 32 knots and carry a heavy anti-aircraft and anti-submarine armament. They are thus dual-purpose craft and eminently suited to modern naval warfare. These six have been given the names of Bouvet, Cassard, Chevalier Paul, Dupetit Thouars, Kersaint, and Surcouf. Of the remaining eight ships in this class, two are being built at Brest and two at Lorient; the place of building of the last four has not yet been announced.

Of the new *escorteurs de deuxième classe*, the first four are due for completion early next year. Twelve are projected, designed as small anti-submarine frigates of 1,250 tons with a speed of 26 knots. Previously reported as having diesel engines, they are now to be equipped with geared turbines. The four under construction have been given the names Bordelaix, Boulonnais, Bretois, and Corse.

Two more destroyer escorts of the *Sénégalais* class have been received from America, now bringing the strength of this class up to 14. The two new ships are the *Bérbère* (ex. U.S.S. *Clarence L. Evans*) and the *Malgache* (ex. U.S.S. *Baker*). They were transferred in March, 1952, and are American Captain-class frigates of diesel-electric drive and a displacement of 1,275 tons.

There are still no reports of the progress of the four ocean-going submarines authorised under the 1949 and 1950 programmes. The names allotted to them are *Dauphin*, *Marsouin*, *Narval*, and *Requin*. They are of a design based on the German Type XX1 U-boat and are being built in drydock from prefabricated sections, each approximately 30 feet in length. They are normal submarine diesel boats, but fitted with Schnorkels.

The submarine *Sibylle* was lost in exercises off Toulon in September, 1952, with the whole of her complement of 13 officers and 34 men. She was diving in a part of the Mediterranean where the depth ranges up to 400 fathoms, and it seems probable that she went too deep and was crushed. The *Sibylle* was the former British *Sportsman*, on loan to France for a period of four years to assist in submarine and anti-submarine training.

A total of 25 new coastal minesweepers of 350 tons have been ordered,

of which 13 are in course of construction. They are of the same type as those being built in this country and the United States, a British design having been accepted for all Western nations. It has been reported that the remaining 12 will be laid down this year.

Under an "off-shore" contract placed by the United States last year, French shipyards have received orders for four escort vessels, nine patrol boats, five minesweepers, and five transports. All will be added to the French Navy except six of the patrol boats, which are expected to be allotted to Denmark and the Netherlands.

### RUSSIA

It is at last possible to begin making an appraisal of the value and the function of the Russian fleet in view of the recent building programmes. An overall view had in former years been bedevilled by persistent reports from Scandinavian countries that several new battleships were being built in Russian shipyards, a fact which made it difficult to appreciate any coherent strategic purpose behind Russian naval expansion. It is clear now that these reports referred to the new Sverdlov-class cruisers, and with this in mind the general pattern of Russian naval strength becomes more apparent.

It is obvious now that the strategic purpose behind Russian building is the *guerre de course*, and that all the new building is devoted to this object. Taking only the comparatively modern vessels into consideration, we can put the Russian operational strength at something like 20 cruisers, 100 destroyers, and 100 submarines. Such a make-up can only point to one conclusion, which is the traditional attack on trade so long advocated as the correct procedure by a weaker naval power in opposition to a stronger. When we add to this the facts that (a) Russian cruisers building are exceptionally robust, and (b) they carry, in general, an armament somewhat more formidable, ship for ship, than other navies, the answer becomes obvious.

The new Sverdlov-class cruisers are, indeed, formidable warships. The Sverdlov herself emerged from behind the iron curtain for the Naval Review at Spithead this year, and she impressed everyone who saw her with her remarkably good looks. Her design shows much in common with the German Hipper-class cruisers, and is probably developed from the ship of that class which was handed over in 1940 during the uneasy Russo-German truce. The Sverdlov displaces some 12,800 tons, 2,000 tons more than the older Tchapayev class, although she carries the same main armament of twelve 6.1-inch guns. The extra 2,000 tons is largely taken up by the stowage of additional oil fuel to give her a bigger commerce-raiding range and endurance. Her reported maximum speed is 35 knots. At least two Sverdlovs are in commission, attached to the South Baltic Squadron, based on Kaliningrad (Königsberg), and reports give another eight in various stages of construction, six in Baltic yards and two in the Black Sea. Such reports, however, should be treated with reserve, for details of Russian naval building are hard to come by.

The new Russian Ognevoi-class destroyers, while obviously good boats, still give the impression of a certain lack of robustness. They are credited with a speed of 40 knots achieved by means of 70,000 shaft horse power. Eighteen of this class are reported to be built or building, but it seems

probable that this figure is an understatement. During the year, a number of the older destroyers have been taken in hand for conversion into fast minelayers.

Arrangements for the return of the two British destroyers Lincoln and Georgetown were completed last year and the two ships were towed back. They served in the Russian Navy under the names of Duizhni and Doblestnyi respectively.

New submarine construction in Russia is devoted to four main types, a large patrol type, a minelaying type, and two types based on German wartime U-boat design, the large type XX1 and the small type XX111. While no official figures are given, it is believed that new construction amounts to approximately 100 boats, but the division between types is not known. The patrol type, based on the well-proved Russian "K" class design, are fitted for minelaying in addition to ordinary patrol duties. They are long endurance boats and are reported to have a full speed of 23 knots on the surface and 18 knots submerged. Most of the original "K" class have been extensively rebuilt with stream-lined hulls.

The older submarines continue in service, but their efficiency must be fairly low. Taking these boats into consideration, Soviet submarine strength is well in excess of 350, of which perhaps 100 can be rated as modern craft in the accepted meaning of that word. These, together with the 100 still under construction, constitute a formidable fleet, as they are nearly all long-range and high-endurance boats.

Russian naval aviation is completely shore-based, but contains a high proportion of jet aircraft. Figures are difficult to come by, but most estimates range in the neighbourhood of 2,500 or 3,000 aircraft. That they are efficient goes without saying, if Russian military experience is anything to go by, and there is a sufficiency of strength to guarantee air superiority over the Russian fleet within flying distance of the land air stations. For normal operations of a *guerre de course*, of course, carriers are not required, as Germany proved during the 1939-45 war. In addition to normal aircraft, the Russian Navy also possesses a large number of helicopters which, in a recent Navy Day exercise, were used to assist in a beach-head landing by bringing in assault troops, guns, and stores. Many of the helicopters are amphibious machines.

It has been reported that the Soviet naval authorities have been carrying out considerable research on new and more sensitive mines. Whether these are the oyster, or influence, type, or whether an entirely new firing mechanism has been evolved, is not known. What is known, however, is that Soviet minelaying capacity, by surface ships, submarine, and aircraft, has been vastly increased during the last three or four years.

Prominence has been given throughout 1952 to Russian claims of sovereignty over vast areas of the Arctic by an article, in the early part of the year in the legal journal *Soviet State and Law*. The article has since been strongly supported by eminent Russian lawyers and by most of the official newspapers. It has also been reported that a naval and air base is under construction in Franz Joseph Land, probably as a counter to the American air base at Thule. If such a base does, in fact, exist, it would constitute an obvious threat to British sea communications in the event of a war between the two countries.

The Soviet fleet, large as it is, is divided into four main squadrons,



stationed in the White Sea, Baltic, Black Sea, and Far East. In spite of a considerable canal system throughout metropolitan Russia, the physical distances involved militate against any rapid concentration of force in any one particular theatre. The present preponderance of the fleet is situated in the White and Baltic Seas and existing port facilities in these areas are amply equipped to maintain all ships stationed in those waters.

Unlike most other navies, the entire Russian fleet is kept permanently in full commission. Subject to the annual allocation of sufficient funds, which seems to be an automatic feature of Russian economy, the advantages of such a procedure are obvious, as it keeps in full training sufficient personnel to man every ship in the Navy. In the past, some doubts have been expressed as to Russian abilities in a maritime sense, but it is known that extensive exercises have been carried out at sea during the last few years, which are certain to have raised Soviet naval efficiency.

### ITALY

Reconstruction of the two small Regolo-class cruisers continues apace. These were stripped right down to the hull and are being rebuilt as fast anti-submarine and anti-aircraft frigates. No date has been given for their completion, but it has been stated that the present progress is satisfactory. Two of the four large destroyers projected under the 1950 building programme have been laid down and given the names of *Impetuoso* and *Indomito*. They are of 2,700 tons, carry as main armament four 5.3-inch dual-purpose guns and three torpedo tubes, with a close-range armament of eight Bofors. Their designed speed is 34 knots.

No details have been given as to the progress of the two new frigates ordered under the 1950 programme. Names are *Canapo* and *Centauro*, and they are being built at Leghorn and Taranto respectively. As designed, they will be of 1,500 tons displacement with a speed of 26 knots. Smaller ships under construction consist of 12 minesweepers of 300 tons and four motor gunboats of 150 tons. It is not known whether the anti-submarine vedettes, of which a number are projected, have yet reached the building stage. These are said to be boats of 300 tons, each armed with a squid, but no authentic details have been released.

Italy has received six landing ships, support, large, from the United States under the Mutual Defence Assistance Programme. These are useful little craft of 250 tons, carrying 12 small A/A guns. The Italian names are *Alano*, *Bracco*, *Mastino*, *Molosso*, *Segugio*, and *Spinone*. In addition to the transfer of these ships, the United States has placed a \$12,000,000 dollar order for corvettes and landing craft under the "off-shore" arrangement.

It has been reported that the old *Nicoloso da Rocco*, a destroyer of 1930 vintage with a displacement of 1,590 tons, is likely to be broken up in the near future. She has been used recently as an accommodation ship, but is suffering from neglect and lack of funds to keep her in reasonable repair. The five small torpedo boats, *Giacinto Carini*, *Nicolo Fabrizi*, *Antonio Mosto*, *Guiseppe Alba* and *Rosolino Pilo*, must also be coming to the end of their useful life. The first two were launched in 1916 and 1917 respectively, and the other three in 1914. Old age has reduced their original speed for 30 knots to something under 20.



## OTHER EUROPEAN COUNTRIES

## BELGIUM

The Belgian Navy was due to reach its full planned peace-time strength in the summer of this year, 1953, with a total personnel of 3,300 officers and men. The last two of the six Algerine class minesweepers were handed over during 1952, H.M.S. Rosario being renamed De Moor, and H.M.S. Spanker becoming De Brouwer.

The Navy was visited early this year by Admiral Sir John Edelsten, Allied Naval Commander-in-Chief in the Channel area, and he reported most favourably on the keenness and efficiency of the Belgian naval force. Several of the specialist ratings are being trained in Great Britain.

## DENMARK

The only new construction taking place in Denmark consists of three small submarines and an unspecified number of motor torpedo boats. The submarines are to replace the three British boats, H.M.S. Vortex, Vulpine, and P.52, now on loan, and are expected to be small patrol boats of about 500 tons.

During the year under review, three frigates were acquired on a four-year loan from Great Britain. They are the former Hunt class destroyers Blackmore, Exmoor, and Calpe, and are to be renamed Esbern Suere, Rolf Krake, and Valdemar Sejr respectively. The United States offered to supply two destroyer escorts under the Mutual Defence Assistance Programme, but they were not accepted as being unsuitable for Danish waters.

During 1952 the two ex-German torpedo boats, T4 and T19, acquired after the war, were discarded from the Navy and have been scrapped.

The fast patrol boat Havornent went aground on Scroby Sands, off Yarmouth, at the end of last year at the top of high water springs. It was found impossible to refloat her.

Denmark is expected to benefit from the \$11,000,000 "off-shore" contract placed by the United States for British inshore minesweepers. It has been stated that these craft will become standard minesweepers for N.A.T.O. countries in Europe.

## GREECE

The destroyer Salamis (ex-H.M.S. Boreas) which was on loan to Greece from Great Britain, has been returned to the Royal Navy. Due for return are two of the six submarines similarly on loan, the Amfitriti (ex-H.M.S. Upstart) and the Xifias (ex-H.M.S. Untiring). Two of the 17 frigates on loan, the Sakhtouris (ex-H.M.S. Peony) and the Kryiazis (ex-H.M.S. Coreopsis) have also been returned.

It is reported that the old cruiser Georgios Averoff is not to be scrapped, as was previously stated, but is to be retained for conversion into a naval museum.

## NETHERLANDS

A moderate increase in the 1952 estimates from 315 million to 347 million florins has enabled Holland to continue with her modified programme of new construction. Her original programme was, apparently, rather beyond

the economic capacity of the country, calling as it did for two complete carrier groups and a number of heavily armed cruisers.

The two new cruisers, *De Ruyter* and *De Zeven Provinciën*, have completed their trials and are now in commission. They are remarkably handsome ships, carrying a main armament of eight 6-inch guns in twin turrets. These guns, designed by Bofors, have an elevation of 60 degrees, which enabled them to supplement the normal close range battery for anti-aircraft purposes. Designed speed was 33 knots, but the figure achieved on trials has not been announced.

There have been some delays in the building of the first six of the 12 new anti-submarine destroyers, and they are not now due for completion until 1954, although they were ordered in 1948. The second six will not complete until 1955 or 1956. The first four of these were designed with a shaft horsepower of 45,000, giving them a speed of 32 knots; in the last eight the horsepower has been raised to 60,000, with an additional three knots in speed. These ships will not carry torpedo tubes, but will be armed with a very complete installation of anti-submarine weapons.

The four new submarines projected under the 1949 estimates will, it is reported, complete in 1954. No details of their construction have been made public, but they are thought to be medium-sized patrol boats of about 900–1,000 tons. Two U.S. submarines are to be transferred to the Netherlands Navy this year on loan for five years, but the names have not yet been reported.

The main work at Den Helder is now completed and the new naval base there can handle large warships at least up to the size of a light fleet carrier.

#### NORWAY

It was announced in Norway last year that Great Britain is to lend two more of the *Hunt* class frigates for a period of years. The two ships selected are the *Beaufort* and the *Zetland*, and they are to be refitted in British yards at Norwegian expense. These two will join their sisters, the *Narvik* and *Arendal*, formerly H.M. Ships *Glaidsdale* and *Badsworth*. The Norwegian Navy was offered two destroyer escorts by the United States under the mutual aid programme, but the *Hunt* class ships were preferred as being more seaworthy and excellent for use in Norwegian waters.

During the year under review, there were protests from Russia at the construction by Norway of sea and air bases in her northern regions bordering on the Soviet Union. Details are lacking as to the location of these new bases.

#### PORTUGAL

No change in the Portuguese Navy has been reported since last year in spite of a small increase in the estimates for the Navy. It has been stated that the five *Vouga* class destroyers, as refitted at Yarrow's shipyard at Scotstoun in the late 1940s, are highly efficient boats but that the remainder of the fleet, with the exception of two ex-British frigates and three ex-British submarines, is inclined to suffer from over-age. While this would be true in the event of war, it is probable that, for Portuguese purposes which rarely run to open warfare, the present ships answer their purpose of coastal defence and maintenance of communications.

## ROUMANIA

Reports have persisted during the year under review that at least four small submarines have been received into the Roumanian Navy from Russia. As the only two modern ships owned by Roumania, which were destroyers, were appropriated by Russia after the war for service in the Black Sea Fleet, these boats may have been handed over as some form of compensation.

## SPAIN

The four ships of the Audaz class, which were launched in 1951, are in commission and it is believed that two more are ready for launching. The names of the six still building have been announced as Ariete, Furor, Intrepido, Rayo, Relampago, and Temerario. They are small destroyers of 1,100 tons, designed for a speed of 33 knots and armed with three 4-inch guns and six 21-inch tubes in triple mountings.

The nine Oquendo class destroyers, of 1943 tons, seem to be hanging fire somewhat. They were ordered to be laid down at Ferrol in 1947-48, but it is believed that only two are building and that they were not laid down till 1951. Reported names of the class are Blasco De Garay, Blas De Lezo, Bonifaz, Gelmirez, Langara, Marques De La Ensenada, Oquendo, Recalde, and Roger De Lavria.

Six new corvettes have been ordered, to be called Atrevida, Descubierta, Diana, Favorita, Nautilus, and Princessa. Of these, four have been laid down at Cartagena and two at Cadiz. Full details are lacking, but they are to be diesel-driven ships of about 900 tons and designed for anti-submarine purposes. The four submarines ordered in 1945 are still under construction at Cartagena and there is no indication yet of when they will be ready for launching. The second of the three larger D-class submarines was commissioned last year and the third, launched in February, 1952, must by now be nearing completion, if not already in commission.

Of the seven new minesweepers ordered in 1947, two or three must by now be approaching completion. They have been given the names of Almanzora, Eo, Eume, Guadalorce, Guadiaro, Navia, and Tinto. They are of 815 tons, carry one 3.5-inch gun, and have a designed speed of 13 knots.

## SWEDEN

Four new destroyers are projected under the 1952 programme. Few details have been announced, but they are to be of 1,880 tons, armed with four 4.7-inch guns and six 21-inch tubes, and a designed speed of 35 knots. Of the two larger destroyers under construction, the Halland and Smaland, it is believed that the Halland is almost complete. These are ships of 2,500 tons, carrying four 4.7-inch guns in fully automatic twin turrets, one forward and one aft.

The three submarines of 800 tons which were approved under the naval estimates of 1951, Hajen, Salen, and Valen, have been laid down, but no details of progress are available. Three more of this class are to be built but, at the time of writing, are not yet laid down.

## TURKEY

A report from Ankara suggests that some of the inshore minesweepers being built in Great Britain for delivery to N.A.T.O. countries as an

"off-shore" order are likely to be added to the Turkish Navy. In addition to 13 ocean minesweepers, Turkey possesses 12 motor minesweepers of which eight are ex-American YMS and four are ex-British MMS.

#### YUGOSLAVIA

It is still difficult to obtain authentic information as to the present state and composition of the Yugoslav Navy. Although the destroyer Split was launched as long ago as 1940, she is still believed to be incomplete. Two more modern destroyers are under construction, if press reports are to be believed, but no details of them have been made public. The two small Italian destroyers Ariete and Balestra, which were damaged by bombs on the building slips and taken over by Yugoslavia after the war, have been renamed Durmitor and Ucka respectively. Although both are in commission, they have not yet been fully fitted with their gun mountings and torpedo tubes.

Equally obscure is the situation with regard to the torpedo boats and submarines which are reported to be under construction at Fiume. Conflicting reports are that three or six of each are building. It has also been reported that three Italian midget submarines of the CB type have been taken over. The German U.81, which was raised and reported to have been found in good condition, has been renamed Tara.

#### SOUTH AMERICAN COUNTRIES

##### ARGENTINA

It has been reported that the two improved King class frigates, Azopardo and Piedrabuena, are approaching completion. They are being built in the dockyard at Rio Santiago and will be of about 1,000 tons displacement.

##### BRAZIL

The eight destroyer escorts, reported in these notes last year as about to be transferred to Brazil by the United States have been taken over by the Brazilian Navy. They are the Babitonga (ex-Alger), Baependi (ex-Cannon), Bauru (ex-McAnn), Beberibe (ex-Herzog), Benevente (ex-Christopher), Bertioga (ex-Pennewill), Bocaina (ex-Marts), and Bracui (ex-Reybold). The construction of the three Rio Negro class submarine chasers has been abandoned and the two already completed converted into small transports. The third has been scrapped.

##### CHILE

The only new construction reported from Chile is of two new naval ocean-going tugs of 500 tons. They are being built at Valdivia.

##### COLOMBIA

The Colombian Navy has purchased a second frigate from the United States. She is the Capitan Tono (ex-U.S.S. Bisbee) and she is a sister ship of the Almirante Padilla (ex-U.S.S. Groton), purchased in 1947.

## PERU

The three escort destroyers transferred to Peru by the United States under the Mutual Defence Programme are the Weaver, Bangust, and Waterman, and have been renamed Aguirre, Castilla, and Rodriguez respectively. They are Captain-class boats of 1,240 tons, fitted with diesel-electric drive. Two new submarines, provisionally named Lobo and Tiburon, have been ordered in the United States, where they will be built by the Electric Boat Company at Groton. No details as to size have been announced. It has also been reported that a landing craft has been purchased from the United States and that another has been ordered.

## URUGUAY

The two destroyer escorts transferred to Uruguay under the Mutual Defence Programme by the United States are the Uruguay (ex-U.S.S. Baron), and the Artigas (ex-U.S.S. Bronstein). As with Peru, they are Captain-class boats. It has been reported that a corvette is being purchased for naval training, but no details have been yet made public.

## VENEZUELA

The third destroyer ordered from Messrs. Vickers-Armstrongs has been given the name of Aragua. She will be built to the same design as the Nueva Esparta and the Zulia. Of 2,600 tons, they will carry a main armament of six 4.1-inch guns and three 21-inch torpedo tubes. Designed speed is 31 knots, and it has been stated that the cost of each will be over £2,500,000. It is reported that a new dock is under construction at Turiamo.

## OTHER COUNTRIES

## BULGARIA

The destroyer, mentioned last year as about to be transferred from Russia, is the Zhelyeznyakov, an ancient boat of 1,300 tons launched in 1917 and completed in the early 1920s.

## CHINA

The Chinese Navy still remains divided between the Communists and the Nationalists, with the larger share belonging to the latter. A report from Communist China during the year announced that their naval forces had been augmented by a gift from Russia of 25 ships, including some destroyers. The Nationalist Navy has also been strengthened with gifts from the United States, notably one escort destroyer, reported to be ex-U.S.S. Jordan, and some patrol vessels and minesweepers. Agreement has been reached between Communist China and Russia for continued use of Port Arthur as a naval base by both countries.

## EGYPT

The fleet minesweeper Sollum capsized off Alexandria during a gale in March, 1953, and was lost with 53 members of her complement. She was the former British Bangor-class minesweeper Wedgeport.

## INDONESIA

The Republic of Indonesia has acquired a useful little navy, mostly by the transfer of ships from Holland. One destroyer of 1,760 tons, the former British *Nonpareil*, and four corvettes, all originally built in Australia, form the backbone of the fleet. Six new motor patrol vessels are being built in Holland for the Indonesian Navy.

## JAPAN

The Japanese fleet was re-born at the beginning of 1953 with the handing over by the United States of 10 ships, comprising six frigates and four landing ships. It has been announced that a further 58 are to be lent to Japan free of cost. So far no names have been announced.

## SOUTH KOREA

The *Chiri San*, one of six small American patrol vessels transferred to South Korea, was mined off Wonsan and subsequently sank. Various other small craft have been handed over during the year, but no ships of any size above that of a minesweeper.

## THAILAND

The Royal Thai Navy, a newcomer to these notes, consists in the main of five frigates and two coast defence ships. A sixth frigate, the *Prasae*, ran ashore on the east coast of Korea just above the 38th Parallel and had to be destroyed to prevent her falling into the hands of the North Koreans. It is possible that both the coast defence ships are no longer in service, the *Thonburi* having been heavily damaged and driven ashore by a French Squadron in 1941, and the *Sri Ayuthaya* being reported accidentally sunk in Siamese territorial waters. However, both have been raised, according to one report from Thailand, and it may be that one or both of them are again in commission.

“SPINDRIFT”

## CHAPTER XIV

### INTERNATIONAL MARITIME EXERCISES OF 1952

BY REAR-ADMIRAL H. E. HORAN

THE YEAR 1952 saw large scale Maritime Exercises being staged by the North Atlantic Treaty Powers. These were the logical continuation of those undertaken in 1951 (see "Brassey", 1952, Chapter XI). The term "maritime" is used because in the exercises under review both the sea and air forces—the latter both carrier-borne and shore-based—were practised not only in their role of controlling the sea communications but also that of bringing support and reinforcements to the land forces under the Supreme Allied Commander, Europe.

#### STRATEGY AND COMMANDS

To grasp the complete picture it is necessary to glance for a moment at the organisation of the Supreme Headquarters Allied Powers, Europe (S.H.A.P.E.) (see "Brassey", 1952, Chapter IX). The strategical basis of the organisation is that the Central Group, under the direct control of the Supreme Allied Commander, composed for the most part of land and air forces, is supported on the flanks by the Northern and Southern Groups. These have up to the present been commanded by naval officers and this seems to indicate that the latter are expected to use maritime power to secure their positions on the flanks and thus enable the Central Group to operate in defence of the vital central sector.

The Supreme Allied Commander, Atlantic (Admiral L. D. McCormick, U.S.N.) has overall responsibility for the allocation of the naval forces of the N.A.T.O. powers and on this side of the Atlantic the Commander-in-Chief, Home Fleet (Admiral Sir George Creasy) holds the N.A.T.O. appointment of Commander-in-Chief, East Atlantic whose immediate jurisdiction extends to the one hundred fathom line off the coasts of Europe. Round the British Isles, Coastal Command is responsible for the provision of maritime Air forces and the Air Officer Commanding-in-Chief (Air Marshal Sir Alick Stevens) occupies the N.A.T.O. post of Air Commander-in-Chief, East Atlantic. There is also the important N.A.T.O. command which is known as Commander-in-Chief, Home and Channel which is held by the Commander-in-Chief, Portsmouth. In this position he is naturally responsible for the safe and timely arrival of reinforcements and supplies from overseas in the west coast ports of Europe.

The exercises are here described as they occurred in each area separately; there would seem to have been no attempt to co-ordinate them in this year.

#### HOME WATERS

The first of the series of exercises in Home waters was known by the code name of BANDEAU. This was really a number of exercises which took place on various dates during the first five months of the year; they were mostly mine-clearing operations in which the anti-mine organisations of various areas were tested. Forces were exercised in the areas



under the control of the Commander-in-Chief, The Nore; Flag Officer, Scotland; Commander-in-Chief, Netherlands; Prefet Maritime Arrondissement I (PREMAR I); and the Commander-in-Chief, Portsmouth. Nothing spectacular was attempted but individual practice was given in the monotonous but vital operation of searching for and sweeping up mines in the areas concerned. The chief immediate object was to get the forces of the different powers to work together efficiently.

These exercises were quite successful and during the same period another series, known as the ANNALS series, was undertaken to test the air defence of shipping in the Narrow Seas. The conducting authorities were Admiral, Benelux; Premar I; and the Commander-in-Chief, Portsmouth.

Exercise BLUEBIRD deserves special mention. This was carried out during the period June 2 to 7 and consisted of an amphibious landing by the Royal Netherlands Marines from British and Dutch landing ships and craft on the coast of Holland at The Texel and near Den Helder. The troops who opposed the landing were the Dutch Territorial Units under the command of the Netherlands Army Commander-in-Chief. The British ships used for the landing operations were from the Amphibious Squadron—H.M.S. "Meon" (Landing Ship, Headquarters) and H.M.S. "Reggio" (Landing Ship, Tank). The successful completion of the exercise was marred by an unfortunate accident when a Dutch Thunderjet Fighter Aircraft crashed into and sank a British Motor Launch.

So far the exercises described have been both simple and elementary. Nevertheless this was essential in view of the number of nationalities involved who hitherto all had their own preconceived notions, techniques, and language. But the next exercise—CASTANETS—was on an altogether different scale. It was conducted by the Commander-in-Chief, Portsmouth in his N.A.T.O. capacity of Commander-in-Chief, Home and Channel, and was designed to test the organisation of the N.A.T.O. Maritime Commands in the whole of his area. These, under his general direction, are responsible for the safe passage of the shipping in the western approaches to the British Isles and the coastal waters round them.

For the purposes of this exercise the Maritime Headquarters at Portsmouth, Plymouth, Chatham, and Rosyth were manned as in war-time. This meant calling up officers on the retired and emergency lists, the alerting of the mine-watching organisation and the manning of the seaward defences at these ports. The area in which operations took place extended to longitude 15 degrees west in the south western approaches and round the coast so as to include convoys from the Firth of Forth to Norway. The forces taking part are shown in Appendix "A": Forces in Exercise CASTANETS—and it is noteworthy that H.M.C.S. "Magnificent"—a light fleet carrier—played an important part.

Two ocean convoys were organised and sailed from Plymouth and Milford Haven to approximately 14 degrees west and then returned. The ships composing them came from all the powers whose shores border on the Eastern Atlantic and the North Sea and the sea escorts were provided by their naval forces. In addition to the ocean convoys, coastal convoys were organised and run as in war-time and the large ocean liners co-operated in that they were open to attack by submarines when passing through the exercise area.

From personal experience the writer can vouch for the fact that the exercise was carried out under realistic conditions and both submarines and air attacks on the convoys kept everyone in them on the alert. But on the other hand the defence was such that it inspired confidence in the convoy personnel. Most notable was the way that the aircraft of Coastal Command maintained their patrols in the vicinity of the ships at sea; the efficiency of communication and co-operation between sea and air escorts was of a very high order. Naturally the weather took a hand and at one time the visibility closed right down which prevented the air escorts from operating. It was surprising the feeling of nakedness this lack of air escort produced.

The attack on the ships in the Narrow Seas by aircraft was very realistic and must have put a severe strain on the defenders. That the latter were there at all clearly shows that the organisation for defence is well drilled and knows its job. The efficiency with which the ships of the various nations acted together, kept station, and obeyed signals had to be seen to be believed. That they should have progressed so far in the short period of two years certainly augurs well for the future.

Besides the convoy operations, the Home Command had to deal with attacks by fast surface raiders, minelaying by both aircraft and surface ships, and attacks by midget submarines on ships in port. Thus the whole exercise was an exhaustive test of all arrangements made for the defence of shipping in the area.

Two interesting side lines were what was called a "Transit Offensive" and an amphibious landing on the coast of Holland. The former was designed to test the effect produced on enemy submarines passing through a given area by the presence of sea and air patrols working in conjunction; while the latter illustrated how reinforcements could be sent to assist the defence.

### MEDITERRANEAN

There were three important exercises for the N.A.T.O. maritime forces in the Mediterranean during the year. The first of these—GRAND SLAM—took place in the western basin from February 25 to March 8. It was carried out under the control of Admiral Carney, U.S.N. in his role of Commander Allied Forces, Southern Europe (COMNAVSOUTH). It was kept on elementary lines as it was the first time that British, French, United States, and Italian ships had attempted to manoeuvre together in large numbers in this area.

This was followed early in June by an advanced tactical exercise—BEEHIVE II—between British and United States ships in the central Mediterranean; certain units from the French, Italian, and Greek navies joined in. The setting envisaged the U.S. naval forces attempting to force a passage for a convoy through the Malta Channel in the face of attack by British sea and air forces based on Malta. The exercise was conducted by the Commander-in-Chief, Mediterranean (Admiral Earl Mountbatten). During the course of this exercise the U.S. Marines carried out an amphibious operation against Malta in order to neutralise the opposition during the passage of the convoy.

The final exercise of the year—LONG STEP—took place between November 3 and 13. It was a set-piece exercise on similar lines to

GRAND SLAM and was in fact a series of pre-arranged movements worked out to give the maximum tactical training to all forces taking part. Admiral Carney, U.S.N. was in control.

The exercise was divided into two phases, the first being a convoy protection exercise and the second a landing on the Turkish coast near Smyrna. The whole scheme was built round the movements of three convoys—one from Marseilles through the Malta Channel to Port Augusta, returning to Toulon via the Strait of Messina; the second from Bari to Port Augusta then to Leghorn via the south coast of Sicily; and a third from Rade D'Huyeres to Bone. The latter carried the amphibious task force of U.S. Marines and proceeded from Bone to Smyrna for the landing exercise. French, Italian, Turkish, and Greek ships operated with those of Great Britain and the United States and the submarines of all these nations operated under a single command from the submarine headquarters at Malta against the passage of the convoys.

The U.S. Sixth Fleet Carrier Task Force operated independently in the first part of the exercise both in attacking and defending the convoys and then joined the assault convoy to Smyrna. Air strikes were carried out on French, Italian, and North African ports and the air operations against Greece and Anatolia included a bombing attack on Makers Island. The local air forces of the nations "attacked" provided their own defence against these strikes and launched counter attacks against the carrier task force. British naval aircraft from Malta provided close escort for the convoys in the approaches to Port Augusta and in the Malta Channel, while Vampires of the R.A.F. formed the air defence of the convoys and task forces within range of their base. French naval aircraft assisted the Royal Air Force in providing anti-submarine patrols in the Ionian Sea and also provided escorts for convoys.

Acting as a fast surface raider, H.M.S. "Manxman" attacked convoys to the west of the Strait of Bonifacio and south of Minorca and also laid mines off Smyrna. After this she resumed her role of raider and harassed the combined amphibious task force on its way to that port. Minesweeping was exercised in the Kithera Channel and the combined minesweeping force swept the assault area in Lebidos Bay.

#### ATLANTIC AND NORTH SEA

The high light of the N.A.T.O. Maritime Exercises was that known as MAIN BRACE. This took place in the North Atlantic and North Sea between the parallels of 55 and 68 degrees north and covered an area of approximately 900,000 square miles. The object of the exercise was two-fold. In addition to exercising the defence of the sea communications in the area from attack by submarines, aircraft, and surface raiders, there was the problem of bringing carrier-borne air support to the N.A.T.O. forces in northern Norway and reinforcements to Denmark. Exercise MAIN BRACE was ten days of simulated war in northern latitudes to test the N.A.T.O. command organisation and to provide the opportunity for the ships of the various nations taking part to work together in realistic conditions.

The list of the actual forces taking part is shown in Appendix "B": Forces in Exercise MAIN BRACE. The whole exercise was controlled by the Commander-in-Chief Allied Forces Northern Europe (Admiral

Sir Patrick Brind). As would happen in war the Supreme Allied Commander, Atlantic—SACLANT—delegated the command of the naval forces in the exercise to the Commander-in-Chief, East Atlantic—CINCEASTLANT—who, with the Air Commander-in-Chief, East Atlantic set up a combined headquarters at Pitreavie near Rosyth.

The general idea of the exercise was that the N.A.T.O. forces were holding a line of defence in northern Norway and the Commander-in-Chief of the area (CINCNORTH) informed Supreme Headquarters Allied Powers, Europe (SHAPE) that he needed support and recommended that SACLANT be asked to allocate naval and amphibious forces for:

- (a) Interdiction and destruction of enemy forces in Norway.
- (b) Air support for ground forces in Norway.
- (c) Air and land support of the ground forces in Denmark.

There were four distinct phases in this exercise:

- (a) Passage to the north from bases in the British Isles of the carrier task force coincident with the sailing of a convoy from Methil to Bergen. Replenishment of the fleet at sea.
- (b) Operations to support the land forces in Norway. Search for and the eventual destruction of a surface raider.  
Return passage of convoy from Bergen to Methil.
- (c) Passage south of the carrier task force to act in support of the land forces in Denmark. Convoy with the amphibious force embarked sails from the Firth of Forth to Denmark.
- (d) Amphibious landings on the north coast of Jutland by the U.S. Marines.

Carrier-borne air support for the N.A.T.O. forces in Denmark.  
Replenishment of the fleet at sea before final dispersal.

The N.A.T.O. forces (Blue) sailed from their bases in the Firths of Clyde and Forth on the first day of the exercise (September 15) and were hardly clear of the land before the first enemy (Orange) submarine attacks developed. As the main carrier striking force approached the Arctic circle the weather, which had been calm and pleasant, rapidly deteriorated and was soon living up to its reputation in these high latitudes. Gales, high seas, and fogs were the order of the day but in spite of all this the force carried out the orders given to it. Air support was provided for the ground forces in the "threatened" area and certain cruisers and destroyers did a bombardment practice against an uninhabited island.

Replenishment of the fleet at sea was carried out without a hitch and then course was shaped for the coast of Denmark. On the way south the weather improved considerably and air activity, which had been much hampered, became intense. An enemy raider which had been lurking in the northern fjords broke out only to be brought to action as the result of good air reconnaissance; she was adjudged sunk before she could do any damage. This raider was the Canadian cruiser "Quebec" and on being "sunk" promptly changed sides!

The convoys to and from Bergen were run according to schedule and were constantly under submarine and air threat but the surface and air escorts claimed many successful attacks on the "enemy." The co-operation between carrier-borne and shore-based aircraft was excellent. One



*(Official Photograph)*

Admiral Lord Mountbatten welcomes Admiral Carney, U.S. Navy, to Malta





instance which was worthy of record as an example occurred when a Firefly aircraft from H.M.S. "Theseus" flying ahead of a convoy made an attack on a submarine. The aircraft's fuel was running out and so the R.A.F. was asked to provide aircraft with longer endurance to continue the shadowing. Promptly a Coastal Command Shackleton arrived on the scene and after shadowing for a time "sank" the enemy with depth charges. When the main carrier and amphibious task forces arrived off the Skagerrak the weather once again stepped in. The beaches chosen for the original landing were found to be on a dead-lee shore but a weather shore was found and thus the landings were carried out. This once again demonstrates the mobility conferred by the command of the sea in any area on operations such as this.

During the closing phase of the exercise another enemy raider, represented by H.M.S. "Apollo," emerged from the Skagerrak. The weather was bad—strong winds, rain, and short visibility; in spite of this she was sighted and reported by aircraft of Coastal Command, and other aircraft shadowed her. Acting on the reports from the latter, surface forces were detached to deal with the menace. As the ships detailed were at some distance and therefore would take time to make contact, the Commander-in-Chief, East Atlantic decided that the raider should be attacked by aircraft. Accordingly a squadron of naval aircraft, which had been working from the airfield at Leuchars, were "scrambled" and sent in to the attack. They had to fly some 200 miles through half a gale of wind and with visibility varying between 100 and 500 yards. However they made contact with the enemy and put in attacks which were adjudged to have reduced the raider's speed. Then the surface forces came up and delivered the *coup de grâce*. This is yet another example of successful co-operation between sea and air forces during the exercise.

At the conclusion of the exercise a conference was held on board H.M.S. "Eagle" in Oslo Fjord. It was attended by the Supreme Allied Commanders, Europe and Atlantic. The remarks of the senior officers taking part were listened to very attentively by H.M. King Haakon of Norway.

#### GENERAL REMARKS

From a study of the foregoing it is clear that the maritime forces of the N.A.T.O. powers are being welded into a first class fighting machine. That this has been done in such a short time speaks well for the work put in by various commands in training the officers and men, further it shows a will among the various powers to co-operate for the common good. To an outsider who has been lucky enough to have seen it, the way the language difficulty has been mastered at sea is a revelation. It is of course quite understandable that the principles of seamanship are common the world over, but he would have been a brave man to have prophesied that in less than three years ships of different nations would be speaking the same language and using the same technique.

The attention given by all nations to the menace of the mine seems only too sound. For a ship to make an ocean passage unscathed and come to grief entering her port of arrival is the height of tragedy. It is well known that the Russians have always laid great stress on the mining offensive. Now that this can be carried out by aircraft the menace is all the worse.



The institution of Maritime Headquarters in all the main commands is sound common sense. The speed and complexity of modern warfare is such that decisions must be made immediately and, if more than one service is involved, these must be made by the responsible officers in consultation. That these headquarters stood up to the strain imposed on them during the exercises under review shows that the organisation is on the correct lines.

The speed and accuracy of the signal and wireless communications are a controlling factor in any form of modern warfare. Without the collection of information on which to base decisions, and the means of transmitting orders to distant forces, all forms of organisation and control would be without value. That mistakes and delays happened during the exercises was only to be expected but on the whole a very high standard of efficiency was shown. That this would have been better after perhaps the first month of actual warfare goes without saying. But it may well be that the first month of the next war will be the most vital. Therefore it is clearly necessary that the personnel, who would have to be recalled from the Retired and Emergency Lists in the event of war, should be recalled in good time and further should at least have refresher courses at short intervals in peace time. The latter is all the more necessary in view of the many new inventions and "ingenious devices" that are constantly being evolved and adopted to-day.

The menace to shipping of low-flying high-speed aircraft in narrow waters seems to be one of the problems to which considerable attention must be given. Usually the first indication one gets of their presence is the noise they make. Then before there is time to do anything about it they dive down to the attack. Evasive action seems of little or no avail and as far as can be foreseen at present the answer would appear to be that they must be intercepted on their way to the target. This is a problem which requires profound thought and study.

For the purpose of giving air protection to a convoy, there is an overwhelming case for the inclusion in every convoy of an aircraft carrier of the light fleet type. Such a ship is capable of taking offensive action against surface raiders, submarines, or aircraft. Further she will be on the spot and the pilots and observers of her aircraft will know the exact tactical situation from their study of the "plot" in the operations room. Therefore they can be air borne in a matter of seconds after an enemy has been reported and being fully briefed can operate to the best advantage and in conjunction with the surface escorts.

The keenness of the Merchant Navy officers and men was admirable. Many that the writer has come across served in merchant ships in World War II. They are fully aware of the importance of a keen look-out and they are quick to spot slackness or inattention on the part of other ships in the convoy. While on the subject of the Merchant Navy it seems only right that in future exercises the Naval Control of Shipping Organisation should be given a chance in peace time to practice its duties in war. This means calling them up for any further exercises but it would be well worth the increased expenditure. If ever war does come there will be no chance to get them accustomed to their duties before its full impact develops.

The Maritime Exercises in 1952 were as has been shown conducted in

different areas at different times. It is to be hoped therefore that in the future the large scale exercises will be carried out simultaneously as would be the case of operations in war. It is no real test of a world-wide organisation to exercise forces in penny packets at different times; in this way wrong ideas can arise and the world-wide responsibilities of maritime sea and air forces be forgotten. Finally the weather must never be ignored. In the exercises under review its influence was marked. People in arm-chairs in nicely warmed, well-lit, and steady offices are apt to forget that things at sea in thick weather with a gale of wind blowing seem very different to the man on the spot who has to deal with them. That the standard of seamanship and airmanship displayed by all the forces of the N.A.T.O. powers in 1952 was high is clearly shown by the fact that no major accidents took place and the tasks assigned were all carried out with success.

H. E. HORAN

**APPENDIX "A".**  
**FORCES IN EXERCISE CASTANETS**

<i>Belgium</i>	..	..	9 Minesweepers Fighter and Strike Aircraft
<i>Canada</i>	..	..	1 Light Fleet Carrier 2 Squadrons of Lancaster Bombers
<i>Denmark</i>	..	..	2 Destroyers 4 Fast Patrol Boats
<i>France</i>	..	..	5 Convoy Escorts 14 Minesweepers 1 Sunderland squadron Fighter aircraft 2 Convoys
<i>Netherlands..</i>	..	..	1 Light Fleet Carrier 2 Destroyers 3 Escort Craft 3 Submarines 12 Minesweepers 1 "Harpoon" Squadron (Aircraft) Naval strike aircraft 1 Convoy
<i>Norway</i>	..	..	2 Frigates 2 Submarines
<i>Portugal</i>	..	..	2 Frigates 1 Submarine
<i>United Kingdom</i>	..	..	1 Battleship 2 Heavy Aircraft Carriers 1 Cruiser 11 Destroyers 25 Frigates 2 Minelayers 11 Submarines 20 Fast Patrol Boats 30 Minesweepers Coastal Command Aircraft Shore based Naval Aviation strike and fighter aircraft 30 Convoys
<i>United States</i>	..	..	Fighter/Bomber Aircraft

**Controlling Authorities**

Naval Forces under the general direction of Allied Commander-in-Chief, Home and Channel and Commander in Chief, East Atlantic.

Maritime Air Forces under the overall direction of Air Officer Commander in Chief, Coastal Command with fighter defence forces controlled by National Authorities.

## APPENDIX "B".

### FORCES IN EXERCISE MAIN BRACE

*BLUE Forces (Under the command of Commander-in-Chief, East Atlantic)*

#### *Carrier Striking Force*

United States	..	4	Aircraft Carriers
United Kingdom	..	2	Aircraft Carriers

#### *Heavy Support Units*

United Kingdom	..	1	Battleship
			1 Cruiser
United States	..	1	Battleship
		3	Cruisers
Canada	..	1	Cruiser

#### *Screen*

Netherlands	..	2	Destroyers
Norway	..	2	Destroyers
United Kingdom	..	12	Destroyers
United States	..	13	Destroyers
		1	Submarine

#### *Amphibious Force*

United States	..	1	Headquarters Ship
		4	Assault Ships
		1	Landing Ship (Dock)
		4	Destroyers
		1	Battalion United States Marine Corps

#### *Carrier Support Force*

Canada	..	1	Light Fleet Carrier
United Kingdom	..	1	Light Fleet Carrier
		1	Cruiser
United States	..	1	Light Fleet Carrier

#### *Heavy Support Unit*

New Zealand	..	1	Cruiser
United Kingdom	..	1	Cruiser
United States	..	8	Destroyers

#### *Hunter Killer Force*

United Kingdom	..	2	Fast Anti-submarine Frigates
United States	..	1	Light Fleet Carrier
		5	Destroyers

#### *Logistic Support Force*

United Kingdom	..	1	Light Fleet Carrier
		1	Destroyer
		4	Frigates
		4	R.F.A. Oilers
United States	..	7	Destroyers
		7	Transports

#### *Convoy Escort Group*

France	..	2	Destroyers
Netherlands	..	2	Destroyers
United Kingdom	..	2	Destroyers
		1	Frigate

*Mine Sweeping Group*

Belgium .. ..	2 Minesweepers
Netherlands ..	7 Motor Minesweepers
United Kingdom ..	8 Minesweepers
	7 Motor Minesweepers

*Miscellaneous Forces*

United Kingdom ..	2 Ships	} Convoy
United States ..	2 Patrol Sea-plane Ships	

Under the Command of Commander-in-Chief, North

*Task Force 152*

Denmark .. ..	2 Frigates
Norway .. ..	4 Destroyers
	4 Frigates
	2 Submarines
United Kingdom ..	2 Frigates

*Minesweeping Group*

Norway .. ..	6 Minesweepers
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*Convoy*

Denmark ..	1 Submarine Depot Ship
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Under Flag Officer, Denmark

*Task Force 153*

Denmark .. ..	2 Destroyers
	2 Frigates
	2 Minelayers
	2 Submarines
	8 Fast Patrol Boats
	3 Motor Minesweepers

ORANGE Forces (Under the command of Flag Officer, Submarines)

*Submarine Group*

United Kingdom ..	8 Submarines
	1 "X" Craft
	1 "X" Craft Tender
Denmark .. ..	2 Submarines
Netherlands ..	2 Submarines
Norway .. ..	2 Submarines

*Raiding Group*

Canada .. ..	1 Cruiser
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*Baltic Group*

United Kingdom ..	1 Fast Minelayer
	3 Frigates
Denmark .. ..	2 Destroyers
	2 Frigates
	1 Submarine
Norway .. ..	2 Destroyers
	1 Frigate

*BLUE Aircraft* provided by Canada, Denmark, France, Netherlands, Norway, United Kingdom, and United States.

*ORANGE Aircraft* Squadrons from Coastal, Bomber, and Flying Training Command. Also from the Netherlands, Norway, and Denmark.

## CHAPTER XV

### BRITISH WARSHIPS OF 1952-53

BY LIEUTENANT-COMMANDER NOWELL HALL.

(*Naval Correspondent, "The Daily Telegraph"*)

ONE NEED only compare the ships at the Coronation Naval Review with those at the previous event in 1937 to see the great changes that have come about in the structure of the Fleet, and therefore in the trend of naval building, during the past sixteen years and especially since the war. Instead of the eleven battleships of 1937 there was one. There were fewer cruisers and many fewer destroyers. On the other hand, there were more aircraft carriers, more submarines, more minesweepers, and about five times as many small fast craft designed for coastal defence and similar duties. The absence of large numbers of destroyers was counterbalanced by the presence of frigates, an old name now adopted for a large class of modern warship which was practically unknown to the Navy in 1937. Apart from the carriers and cruisers, the emphasis at the Spithead assembly was on small ships. It faithfully reflected the Admiralty's post-war pre-occupation with the three main threats an enemy could be expected to level against Britain's sea communications in another war—from the mine, from the submarine capable of high underwater speeds, and from long-range shore-based aircraft.

To-day the Royal Navy is smaller in numbers of ships and in manpower than it was in 1939. In September, 1939, at the outbreak of World War II, it had 178,651 officers and men. At the end of March, 1953, it had 151,000. It is true that this number is likely to decline by about 10,000 by the end of the current financial year, with the planned release of officers and men compulsorily retained after the expiry of their normal engagements or recalled from the reserves because of unexpected new commitments in the Korean theatre and elsewhere. The releases are, of course, dependent on no serious unforeseen needs arising during the next few months.

The Navy, having emerged from the difficult "run-down" period after the war, is now in good shape for its peace-time duties. Never before have normal demands on man-power been greater, such has been the wealth of naval scientific achievement since the war and its accompanying increasing flow of new weapons and new equipment. In 1939 the complement of a battleship averaged about 1,200. The Vanguard, now the flagship of the Home Fleet and the only battleship still in commission, carries approximately 1,800. The 36,800-ton carrier Eagle, which joined the Home Fleet in 1952 as flagship of the Heavy Squadron, has about 2,500, including her air complement: in war-time the figure might well be half as big again. Other fleet carriers such as the Indomitable, Illustrious, Indefatigable, and Implacable would each probably have about 1,350 when fully operational.

The same story can be told nowadays of almost every one of the larger fighting ships. With the much heavier training programmes, the great number of new commitments superimposed on the old (not the least

being the obligations within the North Atlantic Treaty Organisation) the resources of the Royal Navy are now stretched to the utmost. In all the circumstances, it is remarkable that Britain's peace-time Fleet is so large, rather than that it is so small.

The First Lord of the Admiralty, in introducing the current Navy Estimates, gave the strength of the Fleet on March 31 as 545 ships; this total included 166 in the active fleet, 47 on training and experimental duties, and 332 in reserve or reducing to reserve. The figure by no means indicates the true strength of the Fleet, however. It does not include supply, maintenance, and other ships in the Fleet Train, or attendant ships and numerous small craft. Nor does it take note of the large amount of new naval construction, most of which was begun in 1952.

Judging by the few ships actually completed in 1952, there seemed little to show for the millions spent on production and research; but it would be quite unfair to assess the effort by such results. Both 1951 and 1952 were essentially periods of planning. The last period, the second complete financial year of the naval rearmament programme, was chiefly devoted to cementing the foundations and beginning the building itself. The effectiveness of last year's preparations is to be seen in the numbers of minesweepers and other new warships coming from the yards this year. The total should rise steadily from now on.

Most of the 1952 expenditure was on ships approved in earlier programmes and which were already in an advanced stage of completion. Thirteen were accepted into service during the year, the largest being the Duchess, Defender, and Dainty, three of the long-awaited ships of the Daring class. Two others, the Daring and Diamond, joined the Fleet last year, the first going to the Mediterranean Fleet and the second to the Home Fleet. The ten other ships accepted in 1952 were the first of the new coastal minesweepers, eight motor torpedo boats, and a seaward defence boat.

It was but a token delivery, an earnest of the volume of warship building going on in the Royal and commercial dockyards. On March 31, 1953, the following ships were under construction:

#### LAUNCHED BUT NOT ACCEPTED INTO H.M. SERVICE

Aircraft carriers .. ..	8	On two, the light fleet carriers Hercules and Leviathan, work has been suspended. Another light fleet, the Majestic, will be handed to the Royal Australian Navy when ready.
Cruisers .. ..	3	These are the Defence, Tiger, and Blake. Building has been stopped pending results of further research into new equipment.
Destroyers .. ..	3	
Coastal Minesweepers ..	17	
Inshore Minesweepers ..	20	
Motor Torpedo Boats ..	6	
Seaward Defence Boats ..	10	
Surveying ship .. ..	1	
Total .. ..	<u>68</u>	



SHIPS BEING BUILT, BUT NOT LAUNCHED  
(EXCLUDING SUBMARINES AND SMALL CRAFT)

Frigates .. ..	13
Coastal Minesweepers ..	30
Inshore Minesweepers ..	28
Royal Yacht .. ..	1
	—
Total .. ..	72
	—

The Royal Yacht, a vessel of about 4,000 tons and costing in the region of £1,800,000 represents a departure in Admiralty policy, in that hitherto hospital ships (a role the vessel would fill in war-time) have invariably been converted from merchant vessels. Laid down at Messrs. John Brown's Clydebank yard in June, 1952, and launched by the Queen on April 16, 1953, she is so designed that if necessary she could be quickly fitted out for hospital duties in war.

The warships of to-day and the present building programme could scarcely be discussed without reference to all the scientific research work which largely conditions them. For some years past the money set aside for such work has constituted one of the biggest items in the Estimates. Most of the activities in this wide and important field are cloaked in secrecy, but now and again details of achievements are made public by the Admiralty. Last November news was released giving a glimpse of the progress made in the sphere of underwater television, of a demonstration suggesting the great potentialities of this medium in peace and war. By means of a ship-to-shore relay link, observers in a naval establishment at Portsmouth "saw" a diver working on the ocean bed 100 feet down sixteen miles out in the channel. He was one of a special team carried by the Navy's deep diving ship Reclaim. Another recent product of underwater research was a new submarine marker buoy to be installed in all sea-going boats. The first submarine to be so equipped is the Seraph. This buoy is designed to include a small radio set. On the released buoy breaking surface, the set will automatically transmit distress signals to indicate the sunken boat's exact position. Other new scientific developments are noted below.

#### AIRCRAFT CARRIERS

The six aircraft carriers building are the Ark Royal which, like the Eagle, will have a standard displacement of 36,800 tons; the four "Hermes" light fleet carriers, the Albion, Bulwark, Centaur, and Hermes; and the Majestic for Australia. All have been launched, and are well advanced. Three others, also launched, are the Leviathan and Hercules, on which work has been suspended; and the Powerful, now renamed the Bonaventure, which has been bought by the Canadian Government and is being completed in this country at its expense. The carriers for the Royal Navy and the Bonaventure have been much improved since they were begun several years ago. When completed they will be able to operate the fastest and heaviest naval aircraft in service.

The cost of building the *Eagle* was announced as £15,795,000: her sister-ship will cost even more. Their extreme length is 803 feet, beam 112 feet, speed well over 30 knots. The *Ark Royal* was begun during the war, launched in 1946, and may be ready next year. It seems likely that the *Bulwark*, *Albion*, and *Centaur* will be completed before her. These ships have an extreme length of 741½ feet and a beam of 90 feet.

In some respects the *Hermes*, the last of the four to be launched—she was launched by Mrs. Churchill at Vickers-Armstrongs' Barrow yard on February 16, 1953—will be the best of her class. She will be the first carrier to have both the new steam catapult and the "angled deck", two British inventions which after trial are being adopted also by the United States Navy. These are undoubtedly two of the most important developments in naval aviation since the war.

They are complementary. The steam catapult allows carriers fitted with it to launch aircraft heavier and more powerful than any yet in naval service. The "angled deck" enables aircraft to be accepted with greater ease and much reduced risks of accident. The steam catapult, invented by Commander (E) C. C. Mitchell, R.N.V.R., of Brown Bros. and Co., Edinburgh, is based on the principle of the slotted cylinder. It has no rams or hydraulic purchases; the hook to which the aircraft is connected is attached to a piston driven along the cylinder by high-pressure steam from the ship's boilers. A prototype installed in the aircraft maintenance carrier *Perseus* more than fulfilled expectations during a long period of exhaustive trials in home and American waters. In America, all types of aircraft in service with the United States Navy, some of which are appreciably heavier than any at present in the Royal Navy, were used in tests which were completely successful. So powerful is the catapult that with its aid an aircraft was launched while the *Perseus* was berthed alongside in Rosyth Dockyard.

Thus at a stroke a problem which had been worrying the naval aviation experts of both navies was well on the way to being solved. Until the advent of the British steam catapult the arrival in service of ever-heavier, faster, more powerful, more space-demanding types of aircraft was steadily reducing the effectiveness of the smaller carriers. Some experts began to believe that the light fleet carrier was too limited in size and operational scope to meet the requirements of modern naval aircraft.

The invention had done much to put the light fleets right in the van of fighting ships. Equipped with the catapult, a carrier need no longer detach herself from the main fleet to steam at speed into the wind to fly off her aircraft; in certain circumstances, indeed, aircraft can even be launched down-wind. While maintaining station in the fleet carriers will now be able to operate their aircraft at will. The possible effect of this invention on Fleet tactics generally is manifestly most valuable.

Equally important, if not so spectacular, is the "angled deck." This is a re-arrangement of the after part of the flight deck, whereby a returning aircraft approaches the ship and lands at an angle of eight degrees to her fore-and-aft line, instead of from dead astern as hitherto. It eliminates the need for barriers since the possibility of an incoming aircraft overshooting the arrester wires and crashing into planes on the forward deck park is removed. With its way ahead clear, an aircraft making a faulty

approach or touch-down can fly straight on over the landing-deck and come round to make another attempt.

The deceptively simple idea was produced by Captain D. R. F. Campbell, R.N., Deputy Chief Naval Representative, Ministry of Supply, in association with Mr. L. Boddington, of the Royal Aircraft Establishment, Farnborough. Eventually both the steam catapult and the angled deck will be put into all new carriers of the British and Commonwealth navies.

### DESTROYERS

The eight new Daring class destroyers, three of which were put into service in 1952, are the biggest warships of the kind ever built for the Royal Navy. They are the Daring, Diamond, Duchess, Defender, Decoy, Delight, Dainty, and Diana. All were begun between 1945 and 1948, and those still building are nearly ready. As the cost of labour and materials has increased, the total expenditure on each of these ships has had to be revised periodically. The Darings are by far the most costly destroyers built in this country. According to the Navy and Production Accounts 1951-52 the revised cost of the Daring is £2,450,000, and that of the Diamond £2,325,000. A few years ago such expenditure on destroyers would have been unthinkable.

It is not surprising that the Darings already in service have now been put into the cruiser category. Reported to displace about 3,300 tons when in full fighting trim, each ship of this class has been described by Admiral Sir Michael Denny, the Third Sea Lord, as comparable with light cruisers of 20 to 25 years ago, but much more powerful. The Daring has a peace-time complement of 22 officers and 286 men. This number, considerably larger than that for any other destroyer in commission, is made necessary by the unprecedented amount of highly technical equipment of this class of ship.

Designed during the last war for possible use against the Japanese, the Darings' extreme length is 390 feet, beam 43 feet, maximum draught 12 feet 6 inches. Each is all-welded, and propelled by steam turbines which are capable, it is reported in an obvious understatement, of giving a top speed of well over 30 knots. Armament includes twelve guns, six of them of 4.5 inch calibre, and two pentad torpedo tubes. Among the amenities for the ships' companies are all-electric galleys, modern laundries and bathrooms, bunks as well as hammocks, fluorescent lighting in all living spaces and special labour-saving devices for cleaning ship. At the time of writing, the Daring, Diamond, Duchess, and Defender have joined the Fleet and the Dainty is about to do so.

### FRIGATES

The building of anti-submarine frigates and the conversion of certain destroyers in reserve into ships of this new type have priority in the current programme. During the past year the work has suffered some delay from the steel shortage, but the difficulties are being overcome and better progress should now be made. The first six of the many anti-submarine frigates to be put into service joined the Fleet in 1952, all being destroyer conversions. They are the Rocket, Relentless, Verulam, Venus, Virago, which are full conversions, and the Tenacious, a limited conversion.

Under the present programme the Admiralty plan to convert 44 of the war-time destroyers in reserve into frigates and to build 24, of which 13 are now under construction. In the late 1940's a large number of the Navy's destroyers designed for escort and similar duties were reclassified as frigates. Excluding seven being refitted for loan to India, Denmark, and Norway, the Royal Navy on March 31, 1953, had 161 frigates of various types. Of these 31 were with the active fleet, 17 on training and experimental duties, and 113 in reserve.

The anti-submarine frigates are produced in three categories. There are full conversions, involving major alterations of structural design; limited conversions, effected quickly and comparatively cheaply; and new construction, this including a "utility" type which in an emergency can be turned out rapidly in large numbers.

Soon after the war it became evident that a new kind of light warship would be needed to combat the modern submarines which might be used against shipping and sea communications. Such submarines are likely to be big boats of high performance and endurance, with an underwater speed of twenty to twenty-five knots and possibly more. A new kind of vessel was wanted which would be as speedy and manoeuvrable as the Navy's fastest destroyers, and have their sea-keeping qualities, to enable work with the Fleet and convoy duties to be carried out in bad weather.

The Navy's immediate answer to the menace of the fast submarine was to begin to convert several of its war-time destroyers in reserve into anti-submarine ships of a type which in a few years will probably occupy a most important place in the post-war fleet. The two prototype frigates, the *Rocket* and *Relentless*, are converted from 34-knot destroyers of the *Rotherham* class. They embody much that is new in warship design. A large part of their former armament has been sacrificed so that the maximum amount of anti-submarine equipment can be carried. To save weight extensive use has been made of light materials. The appearance of the ships has been much altered. The superstructure is built out flush with the sides, making for more roominess in enclosed spaces. The forecastle deck is extended well aft and the conventional bridge is reduced. For navigation in the completely enclosed bridge there are clear view windscreens and a periscope. A 4-inch gun has been mounted aft and there is now no major gun forward of the bridge. The main armament consists of two triple-barrelled mortars which are more effective anti-submarine weapons than any carried in ships during the last war. The general effect is pleasing, the frigates having a low, stream-lined silhouette. Performance is also well up to expectations.

In December the *Rocket* returned to Londonderry after spending two months in American waters at the invitation of the United States Navy. Exercising with warships from the United States naval base at Key West, Florida, she demonstrated her new weapon and other anti-submarine devices and afterwards went to Halifax, Nova Scotia, to show her paces to the Royal Canadian Navy.

The mortar weapon with which all the new anti-submarine frigates are being equipped can be trained over a wider area than was possible with the earlier types. It can fire a pattern of finned under water bombs with great accuracy well ahead of the ship, the projectiles being automatically set to explode at a given depth. Linked with an asdic set through an

improved electronic fire control system, the weapon takes over once the ship is within striking distance of the target, aiming, adjusting the range and critical depth for the projectiles, and firing automatically. No matter what evasive action the submarine may take, her movements are followed by the "electronic brain." The First Lord of the Admiralty said last October: "We have now had time to evaluate the first few anti-submarine frigates and the general opinion is that they are an unqualified success."

### MINESWEEPERS

The past year has brought more warnings of the potential threat of the mine. In the House of Commons Mr. Churchill said that the three main threats the Royal Navy must meet are the mine, the U-boat, and the aircraft, adding that each one, if successful, could affect the nation's survival. He mentioned them in that order, conveying the impression, perhaps intentionally, that the mine is now considered as the greatest menace to Britain's security at sea.

The Royal Navy and the Navies of other countries of the North Atlantic Treaty Organisations are doing their best to grapple with this problem. In most of the N.A.T.O. naval exercises of 1952, minesweeping practices played a big part, and the major events, such as "Mainbrace" and "Castanets," served again to stress the need for many more small ships. Reviewing in 1952 the progress made in building up the allies' maritime defences, General Eisenhower, then Allied Supreme Commander, Europe, said that more efforts must be made to strengthen the anti-mine and anti-submarine forces. Similar warnings were given by Admiral McCormick, Supreme Allied Commander, Atlantic, Admiral of the Fleet Sir Arthur Power, then C.-in-C., Portsmouth and C.-in-C., Home Station under the Organisation, an appointment investing its holder with responsibility for protecting Britain's coastal waters in time of war, was more specific. Addressing members of the newly-formed Royal Naval Minewatching Service he said that the mine was the biggest threat to our sea communications and that the scale of sea-mining which could be expected in any future war would be greater than ever before. "On this question the country is sound asleep," he declared. "Only a very small percentage of the population want to face the facts."

The Admiralty are facing the facts. In the present programme minesweepers and minesweeping equipment have top priority. Not only are there now more minesweepers in commission than ever before in peacetime, but the building of the smaller types of minesweepers forms the main part of the naval construction effort.

The Fleet has now 176 ocean, coastal, and inshore minesweepers. Of these 48 are with the active fleet, 14 are on training and experimental work, and 114 are in reserve, the last figure including ships being fitted out for such duties. Another 95 coastal and inshore minesweepers were being built in commercial yards at the end of March, 1953, and a further programme is being begun this year. Even so the Navy is and will remain short of minesweepers. The demand for these small vessels is insatiable. Though work on most of the new warships has been subject to delays for reasons beyond the Admiralty's control the minesweeper programme has, on the whole, progressed according to plan.

In the first sixteen months of the last war more than 200 ships, excluding

fishing vessels, were sunk by mines around Britain's coast, mostly in the Thames and Humber and their approaches. The rate of sinkings fell steadily as the mine defences were organised, until towards the end of hostilities the enemy was discouraged by his meagre successes and abandoned this form of attack. Should there be a next time another such "period of unpreparedness" would be unpardonable.

Since 1945 much scientific progress has been made in the field of mine warfare. Moored and ground mines have been fitted with a great variety of improved and new firing devices, immediate and delayed, and are more difficult to sweep or otherwise destroy even with the employment of considerably larger minesweeping forces. Such weapons, striking indiscriminately at shipping, sometimes years after they are laid (as is proved by the occasional sinkings still reported) might well be sown in large numbers in coastal waters, harbours, estuaries and rivers.

From the list of construction given earlier in the chapter, it will be noted that the numbers of new minesweepers are more or less equally divided, 47 being coastal vessels and 48 inshore vessels. The first of the coastals, which was accepted recently, is the *Coniston*, nameship of her class. She is 152 feet long with a beam of 28 feet 9 inches and has a peace-time complement of two officers and 24 men. Her cost is estimated at £447,000. The coastals, which the Admiralty describe as minesweepers of an entirely new type, are built largely of non-magnetic materials. Aluminium is incorporated for the framing and structural castings and the outer bottom is wood planked. Being of similar design, the hulls of the ships can be rapidly fabricated. Their diesel engines are standardised to simplify maintenance.

The inshore vessels, designed for use in estuarial waters, are smaller, having a length of 106 feet 5 inches and a beam of 21 feet 2 inches. Each mounts one small gun, compared with the larger coastal's three. The *Inglesham*, the first of the inshores, was launched on April 23, 1952, and completed a year later.

The acceptance and storage of minesweepers which are now beginning to come from the yards in substantial numbers has presented something of a problem, as the need for a minesweeping base had not arisen before in peace-time. On March 3 last *H.M.S. Diligence*, which is on the site of the former B.O.A.C. base on the western shore of Southampton Water was commissioned as a base for minesweeper and patrol boats. Coming within the command of the Flag Officer Commanding the Reserve Fleet, it provides for the equipping, commissioning, trials, and maintenance of coastal and inshore minesweepers and serves as a reserve base for fast patrol boats.

Announcing the commissioning of *H.M.S. Diligence*, the Admiralty said that the base would include a slipway for the smaller minesweepers and the fast patrol boats and that a second slipway would be built to take both the coastal and inshore types. A large part of the two hangars taken over would house workshops and there would be a pier with berths for eight or nine minesweepers. Trots of buoys being laid to take a large number of craft would be extended as necessary. As most of the new vessels are going into reserve on completing their trials, considerable space is allocated to this purpose. Maintenance of laid-up ships will form a large part of the organisation's work.

The civilian-manned Royal Naval Minewatching Service which was formed in January, 1952, has made a slow start. The Admiralty want at least 30,000 men and women who would be available in time of war to man observation posts ashore and afloat and to report the exact position of splashes which might be caused by mines dropped in harbours and other important waterways. By the end of last March the total of volunteers had, however, barely reached 3,000. Several mine-spotting exercises were held at Portsmouth and other places during the year. The work is essential, if unspectacular. How important it could be was indicated by Admiral Power when he told members of the Service that if it was known where mines were laid their disposal would be comparatively simple.

The badge of the Royal Naval Minewatching Service consists of a silver "splash" on a blue ground with two silver waves below, the whole being surmounted by a gold naval crown and the letters R.N.M.W.S. and encircled by a gold rope with the ends crossed at the foot.

### PATROL BOATS

In the field of marine propulsion, especially in that part of it concerning gas turbines for small warships, notable progress has been made during the past year. At present Britain has a lead of four to five years in marine gas turbine development. In 1947, M.T.B. 2009, now 5559, became the first seagoing warship of any Navy to be fitted with a "Gatric" engine, rated at 2,500 h.p., being used in conjunction with the boat's Packard engines when full power is needed. Among the gas turbine's advantages are high power for weight and space, low maintenance, greater manoeuvrability, and very rapid starting. The tests with MTB 5559 were remarkably successful, and demonstrated the engine's great possibilities for small craft where a low rate of fuel consumption is not of first importance. The Admiralty later placed a contract with Messrs. Metropolitan-Vickers Electrical Co. Ltd., for four larger gas turbines of improved performance known as G2s, of 4,800 horse-power and based on the Beryl jet engine developed by the same company. The engines have since been installed in two fast patrol boats, the Bold Pioneer and the Bold Pathfinder, both of which came into service recently. Each is fitted with two gas turbines and has twin funnels and can be armed to serve as an M.T.B or an M.G.B. Two G2 engines have been ordered by the United States Navy for trial.

To make possible further research the first test house for naval gas turbines was opened on March 18 last at the National Gas Turbine Establishment at Farnborough. In it naval engines of up to 10,000 shaft horse-power can undergo trials in conditions closely resembling those to be found at sea.

At the opening of the building, Adml. Sir Michael Denny, Controller of the Navy, said that as a result of important decisions made regarding the future of gas turbines in the Royal Navy he felt sure that the Merchant Navy and the rest of the world would be quick to follow the Royal Navy's example. The consequences might well prove as revolutionary as the partial supersession of the steam reciprocating engine by the steam turbine at the turn of the century. "In the near future," he said, "gas turbines will be found in all classes of vessels in some form or other. I



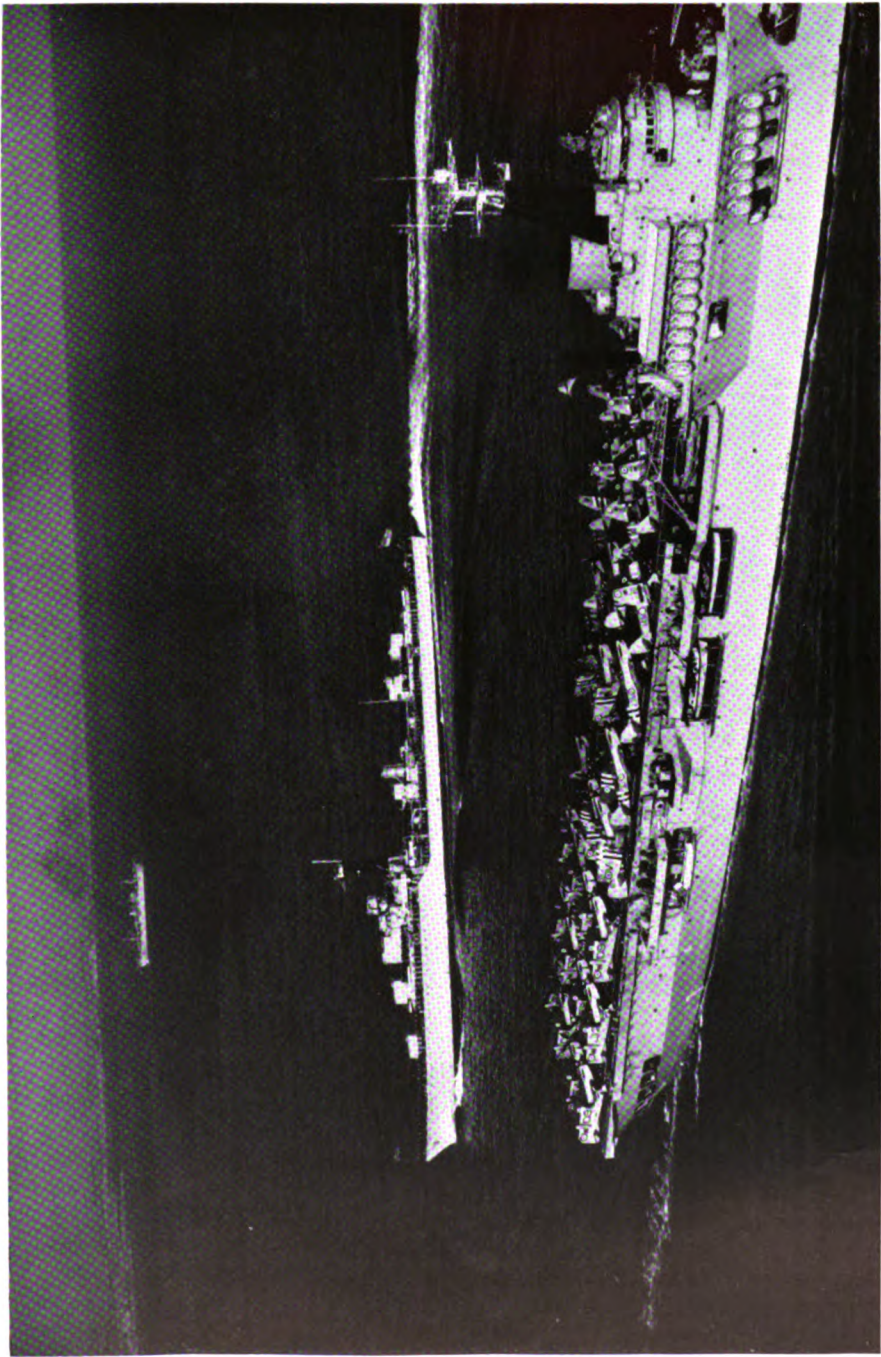
am not suggesting that capital ships will have complete gas turbine propulsion during my time in the Royal Navy, but I am suggesting that a number of applications of gas turbines will be in use afloat during my life time. Ships will certainly have power generating sets in the very near future. Smaller ships will undoubtedly have gas turbine propulsion, and gas turbines might well be fitted in aircraft carriers, cruisers, destroyers, and frigates as boost sets for use when the full power for which a ship is designed is required." The Admiralty is also putting two Rolls-Royce gas turbines into the Grey Goose, a motor gun-boat of 205 tons.

The first six of the "Gay class", a large new class of smaller M.T.Bs, have been delivered. Propelled by Packard engines and having a length of 75 feet and a beam of 20 feet each of these wooden-hulled boats is a development of the type of short M.T.B. produced between 1939 and 1945. Like the "Bold" class, they can be armed as motor torpedo boats or motor gun boats. The first of them, the Gay Bombardier, costing about £78,200, was accepted last February. In peace-time she carries two officers and ten men, the number varying according to her function.

The Shalford, the first of the Seaward Defence Boats, a new design of vessel, was also accepted last February. Little information is yet available about these craft. They are slightly larger than the new M.T.Bs, having a length of 117 feet 2 inches and a beam of 20 feet. The Shalford has diesel engines and an armament including guns, flares, depth charges, and electronic equipment. Seaward defence boats are intended to deal with midget and other submarines in the approaches to defended ports.

Referring in April, 1953, to further results of research into methods of powering high-speed coastal craft, the Admiralty stated that the Deltic, a light-weight diesel engine rating up to 2,500 b.h.p., had been designed and developed for the Royal Navy by Messrs. D. Napier, of Acton. This opposed-piston two-stroke engine is constructed in triangular form with three crankshafts. It has a remarkably high power for its weight—under 5 lbs per S.H.P., compared with about 83 lbs per S.H.P. of a standard commercial marine diesel engine of similar power. To obtain experience of the engine's behaviour at sea, two have been installed in the Fast Patrol Boat 5212, a modified ex-German E-boat originally fitted with three Mercedes-Benz diesel engines, one of which has been retained. The Admiralty announcement, recalling that hitherto the risk of fire inherent in the use of petrol in patrol craft had had to be accepted because no suitable diesel engine was available, expressed the expectation that the Deltic engine would probably replace petrol engines altogether. If so, reliability would be improved, and maintenance would become simpler.

NOWELL HALL



*(Official Photograph)*  
Mediterranean Fleet. H.M.S. Daring saluting H.R.H. the Duke of Edinburgh embarked in H.M.S. Theseus



## CHAPTER XVI

### NAVAL SIGNALLING

#### I. HISTORICAL

BY COMMANDER HILARY P. MEAD

THE EARLIEST signals in the English fleet were of the most primitive kind, and lagged some way behind even the crude methods of the Mediterranean. In the swift manoeuvres of galley warfare some sort of formula was necessary, but in northern waters where the clumsier sailing vessels fought, the need had not been found. Therefore, for many years during the 14th, 15th, and 16th centuries the English navy had but two or three signals, the flag for a council-of-war, or for the captains to repair on board the admiral's ship, a signal for sighting the enemy, and a gun signal for distress. These were not added to during the Spanish Armada operations, and the admiral of those days was enjoined to have a swift pinnace at hand to convey his orders to the ships of the fleet. The arrangements persisted in practically the same form until the middle of the 17th century, with the addition of some signals made with the sails to denote an enemy in sight; and some others made with a wheft, a strange object consisting of a flag tied in the middle, or perhaps only of a garment hung in the rigging. A wheft on the main stay, for instance, was a signal of distress.

During the Dutch War of 1652, however, there was some distinct progress; flag signals to meet the newly drawn up Fighting Instructions could be performed with four different flags, the signal to "Engage the enemy" being made with the red flag at the fore topmasthead and two guns. Tactics, then rudimentary, required only a few rudimentary signals. The significations were entirely associated with manoeuvring, and nothing had been introduced to deal with the daily needs of life in a fleet, unless one takes into account the simple hoisting of a cask at the yard-arm to imply a want of water, a hatchet when in need of wood, or an empty bag for bread, and a table-cloth as an invitation to dinner. In 1673 the flags used in signalling had risen to fifteen, and in the same year the Sailing and Fighting Instructions were printed for the first time. For the following one hundred years the instructions were based on the same principles.

At the beginning of the 18th century the signification of flag signals still varied according to their position at the masts or in the rigging of the ship in which they were hoisted, and there were no fewer than eighteen different places which could be so used. For instance, a plain yellow flag had various separate arbitrary meanings when shown in different places; at the peak it signified "Flagships in a line of battle ahead to keep two leagues asunder"; at the fore topmasthead it meant, "Fill and stand on." By the middle of the century, sail signals had been extended to eight significations; for example, for the fleet to unmoor, the flagship's main topsail was loosed; on springing a leak, a ship's courses were hauled up.

The volume of Instructions was of folio format and therefore not very suitable for use on deck, and when the flagship hoisted a signal it needed a diligent search in the Instructions to find its meaning, for there was no

pictorial plan by which the different coloured flags could be picked out, and a signal book proper was badly needed. In default of an officially printed one being provided, officers frequently made their own pocket manuscript signal books with a page or two to each flag. In the meantime, in 1714 and 1746 respectively, two private civilian publishers, Jonathan Greenwood and J. Millan, produced engraved pocket signal books, which showed the flags in colour and the significations with them. The first contained four ships at an opening, with the flags in the rigging, and the purport beneath each; the other had the different flags at the top of the pages, and the positions and meanings tabulated below. Both these little publications were most popular, and several copies are still in existence.

From 1750 onwards more Additional Instructions were issued, and more and more flags were needed to express them; some of them were faulty in design, with red and blue parts in contact, and the business of showing each of them in different parts of the masts and rigging tended to complicate the situation. By 1782, at the Battle of the Saints, Admiral Rodney was using nearly fifty symbols.

In the art of signalling so far described it will be seen that the orders were given in books of official Instructions, explaining the appropriate flags in words, and consequently it would be in vain to look for any contemporary official book of coloured signal flags, for none existed at this period. Meanwhile reformers were at hand, and Admiral Lord Howe was trying something different; the new idea was to have a book of signals, and a subordinate book of instructions to explain the signals where necessary, thus reversing the process that the new idea was going to supplant. First, Lord Howe reduced the number of flags to a reasonable figure, twenty-one in all, and of improved design. This was in 1776, so that the old and new methods overlapped for several years, though they were not in use on the same stations. The significations were grouped together in their relevant contexts on the same page, and the signals were referred to by the number of the page, and the number of the signal on the page. In Lord Howe's 1782 signal book there was a slight change of arrangement as the signals were all numbered, but the flags were still being hoisted in the usual different places to convey their meanings. It is quite evident that the signal book now really did take precedence over the instructions, for the titles were as follows: "Signal Book for the Ships of War," and "Instructions for the conduct of the Ships of War, explanatory of, and relative to the Signals contained in the Signal-Book herewith delivered."

It is difficult to say to what extent Lord Howe and Rear-Admiral Richard Kempenfelt respectively made the greater contribution to the development of signalling in the Royal Navy at this period. Signal books attributed to each appeared in 1782; Kempenfelt's had advantages: his flags were much better chosen as regards distinction, and his method of reading the signals was progressive. Each hoist consisted of two flags, the upper of which came from the top of a page, the lower flag being taken at one side of the page or the other, in a cut out, open margin; the signification was opposite the side flag. An example is: at the top of the page, Blue with yellow cross; and at right-hand side, Red with white cross; No. 49, "To keep in closer order, in Line of Battle." For the first time the posi-

tional method was not used, and the two-flag groups could be hoisted anywhere. Kempenfelt's 1782 signal book and instructions both measured 13 ins. by 8 ins., still rather large for use on deck, and certainly not bearing any resemblance to the little pocket books of a few decades earlier. Richard Kempenfelt did not live long to see his plans brought to fruition for he lost his life in August 1782, in the "Royal George" disaster.

So it was left to Lord Howe to complete the reforms. His signal book of 1790 marked a new phase, the final adoption of the numerary system. It certainly seems strange that it had taken all these years to evolve such an obvious arrangement in which ten numeral flags, carrying the values of 1 to 0, were simply to express numbers. So it was that any two or three-flag group could be made to denote any figure from 10 to 999. This then was the new system, carried on to modern times, with the augmentation that in 1827, letters of the alphabet were allotted to several symbols, and thereafter a signal could be made by a numbered or a lettered group. Moreover the flags chosen for this new book as the ten numerals were of most excellent design, and were handed on to the twentieth century with little alteration, through with occasional reshufflings. In 1790 numeral 1 was a plain red flag, but this disappeared in 1799 in favour of a piece, yellow-red-yellow in horizontal bars; the probable reason was to avoid confusion with the plain red flag of vice- and rear-admirals of the Red Squadron.

"The Signal Book for the Ships of War" was now accompanied by two other volumes, the "Instructions" above mentioned, and "Night Signals and Instructions for the Conduct of Ships of War." Night signals were made with from two to four lanterns in the rigging, with false fires or rockets, and with from one to seven guns. (A false fire was what would be called a blue light in more modern times.) An example is: two lanterns vertical, a rocket and four guns, "Bear up and sail large." Various editions of the signal book followed under the dates of 1793, 1794 and 1796, and all were of uniform ordinary quarto format. Finally in 1799 the signal book was fully developed and was issued with the authority of the Admiralty, the front page bearing the directions and signatures of their lordships. Besides other improvements this book contained a code of distant signals for use when the colours of flags could not be distinguished. They therefore relied on shape, and made use of balls, square flags, and pendants of which the colours were immaterial.

Two other systems of signalling in force at the turn of the century were carried on for about another hundred years, and it is appropriate to refer to them here. The method of conveying information by manipulating the sails had the advantage of their being observable when perhaps the ship's hull itself was below the horizon. They were being used in the fleet at the time of James I, and later on instructions for them were to be found in the Admiralty signal books up to 1879. Two topgallant sails and two royals were employed, and they were to be "exhibited furled and loosed," and "exhibited furled and set." "The Young Seaman's Manual" by Burney was still showing these sail signals in its 1901 edition, but their use must have been extremely rare so recently as that.

Gun signals were of ancient origin, and in the early 18th century most visual signals were accompanied by at least one gun to emphasise them. In later times the use of guns was chiefly for signalling in a fog, and indeed

persisted in the days of steam until wireless telegraphy had come to stay. As late as 1905 gun signals on the old principle were still used in the fleet in a fog, and a special mahogany board was kept in the chart house with holes in it in which pegs were to be inserted as each gun was heard. Routine guns were fired every half hour at sea; one gun meant "Continue the same course and speed." If there were any other signal it followed two minutes after the half-hour gun, and consisted of "Preparative Guns" at ten second intervals; then a pause of one minute, followed by "Signal Guns" at thirty second intervals. So the pegs were inserted in two groups, and the result referred to the table of gun signals, and the purport made out. There were up to five guns in each group, and the total number of signals was thirty. An example is: Signal No. 22, "The fleet is to anchor"; made as follows: 1 gun, 10 seconds, 1 gun, one minute, 1 gun, 30 seconds, 1 gun.

The changing of the numeral flags from time to time was partly owing to the code becoming compromised; this happened in 1803 because one of the surreptitious manuscript signal books kept by an officer fell into the hands of the French. In November 1803 the flags were changed, and remained so until 1810, including the Battle of Trafalgar. Some examples of the changing are: the Blue Peter from No. 0 became No. 2; the yellow-red-yellow (mentioned above) changed from No. 1 to No. 5.

So far in the Royal Navy, the signal books had not been able to express any but arbitrary significations, and there was no means of carrying on a conversation, or sending a message visually that was not in the book. An innovation by Captain Sir Home Popham, R.N., in the form of a "Telegraphic Vocabulary" was an excellent solution of these difficulties. He began it in 1800, and his plan was simplicity itself, merely to attach numbers to the words of a selected vocabulary, and signal them by means of the numeral flags already in existence in the "Signal Book for the Ships of War". To distinguish hoists taken from the two books, those from Popham's "Telegraphic Signals or Marine Vocabulary" were prefaced by a special "telegraph" flag, and there was no occasion for mistake.

During the Trafalgar operations the ratings responsible for signalling, namely the quartermasters and their mates, in the various flagships and repeating ships, had entirely mastered the art of telegraphing from Popham's book. So much so was this the case that several most important messages as to enemy movements were passed easily and quickly along the line of lookout frigates and the chain connecting them with the C.-in-C. Captain Blackwood in the "Euryalus," for instance, signalled such messages as "The enemy appears to be determined to push to the westward, thirty ships" and "I am going to the admiral but will return before night." And Nelson signalled to Blackwood, "I rely on your keeping sight of the enemy." All these were telegraphed from Popham's vocabulary word by word, and hoist by hoist.

Several years before he turned to writing his famous novels, Captain Frederick Marryat, R.N., had in 1817 produced his almost equally famous "Code of Signals for the Merchant Service." Although a few other codists had thought of the same idea, Marryat's code was so excellent that it gained an immediate and universal vogue. It filled a long-felt want because hitherto there had been no means of signalling by merchant ships unless in convoy. The code was similar to Popham's vocabulary except

that it was divided up into sections or "Parts," such as names of places, sentences, vocabulary, and so on. Its requirements were met by ten well designed numeral flags, with the addition of a few extras including some "distinguishing pendants" which were hoisted over numerals to point out different tables of ship's names. So it was that besides providing a comprehensive dictionary of general signals and wants, it supplied the signal numbers of all vessels then in circulation. From being a slim volume in 1817 the code grew to much thicker proportions, and even after its author's death in 1848 it progressed into being the accepted signal book not only for English ships but for those of many other countries. Such a successful work was bound to have imitators and rivals, and by 1857 these had become somewhat of an embarrassment. It was in that year therefore that the British Board of Trade sponsored a new "Commercial Code of Signals" to supersede Marryat's and all the other codes. Although adopting most of the flags of Marryat's design, the new code was modelled on the alphabetical system instead of numeral; that is, there were eighteen lettered flags, from B to W, omitting vowels. The intentional omission of the vowels was really incredible and ridiculous, the reason being that it was desired to avoid objectionable words of three or four letters which might be framed by rude sailors! As the alphabet was incomplete, of course the flags could not be used for spelling, and so recourse was had to some very cumbersome shifts to obviate this defect.

The title of the book was changed to "International Code" in 1869 or 1870, and by 1887 it was found to be badly in need of revision. In its new form in 1901 the code consisted of a complete alphabet, and there were several innovations such as night flashing, flag waving, and manual and mechanical semaphore, besides three separate systems of long-distance signals. The provision of two of the long-distance tables was sheer waste of time, as they depended on "shapes," drums, balls, cones, and whefts, and in later years it was discovered that they had never been used at sea, so far as any records went. Probably the only exception was the long-distance signal of distress, consisting of a ball and a drum.

From 1857 to 1931 the set of signal flags had been augmented by a piece known as the "Code Signal and Answering Pendant" (later altered to "Code Flag and Answering Pendant"). As an answer to signals from another ship it was hoisted at the top of the halyards when each signal was understood; and when making signals it was hoisted below the ensign to indicate that they were being taken from the official Code and not out of Marryat's book. This was really rather a compliment to Marryat, for it admitted that his book was being used despite the superseding one, and that shipmasters preferred to go on using Marryat's code, fresh editions of which were issued right up to 1879, and it is recorded that his flags were still being used in France as late as 1890.

From 1857 onwards, signalmen of the Royal Navy had to cope with two sets of alphabetical flags, those of the Commercial or International Code, and those of the naval code. In 1901 twelve of the flags were of the same design in both systems, but only one, letter O, was common to both. Therefore a naval signalman had to remember, for instance, that flags A, B, and C in the naval code were Y, W, and Z respectively in the mercantile code.

The closing years of the eighteenth century were remarkable for the introduction of the telegraph in various forms. On the continent of



Europe the French system, invented and perfected by Citizen Claude Chappe in 1792, had in a few years become widespread and stretched in all directions. It consisted of an upright post having a pivoted beam at the top, and at the ends of the beam two further smaller pivoted arms, so that both the beam and the arms could be turned in various directions at the same time. It was called the "T" telegraph, as when it was at rest it resembled the letter T, the two smaller arms forming the top *serifs*. Chappe became almost a national hero, and a statue was afterwards put up to his memory in Paris at the Rue de Bac. This distinguished monument was removed and sent to be melted down by the Germans in 1942.

Although the "T" telegraph could hardly be considered a maritime development, it doubtless inspired English telegraphers to turn their attention to the possibilities of imitating Chappe. In England the Rev. Lord George Murray, son of the Duke of Atholl and Bishop of St. David's, was the first inventor to attain any real success. His plan was to have a large vertical frame in which were pivoted six shutters, *louvres*, or "valves". The shutters were poised open, and pulled shut by the operation of chains or ropes, much after the style of bell-ringing. Between 1796 and 1808 sixty-four stations had been built and all were in working order, keeping up communication from the Admiralty in London to Portsmouth, Plymouth, Chatham, Sheerness, Deal, and Yarmouth. These stations were given up in 1814, as telegraphs were considered entirely unnecessary. However, a few years later it was decided that similar lines to Portsmouth and Plymouth would be an advantage for speedy communication with the admirals at those two Home Ports, even in days of peace. This time the semaphore of Sir Home Popham was chosen, a tall machine having two arms on separate pivots, one at the top of the 30-foot post, the other 12 feet below it. The shutter telegraph frames had been mounted on the roofs of primitive huts or cottages, but the new semaphores were erected on costly and substantial buildings of one story, two stories or towers of five stories, according to the elevation of the place with respect to its neighbouring stations. Of the tower type only two were built, at Chatley Heath near Cobham and at Worplesdon in Surrey. The tower at Chatley Heath is still standing, and eight of the other houses in Surrey, Sussex, and Hampshire still survive in a good state of preservation. The new Portsmouth line was in full working order in 1822, and was only given up in favour of the electric telegraph on the last day of 1847. The projected line to Plymouth never reached beyond the borders of Hampshire and Dorset and was abandoned, and so did not function. The complement of a semaphore station was only a lieutenant and one man; both had probably been incapacitated in war, and thought themselves lucky to have the berth. It is obvious that the stations could not be constantly working, and there was no provision for night signalling.

An equally successful telegraph ran between Holyhead "Mountain" and Liverpool, and did valuable work in reporting the movements of merchant ships from 1827 to 1861, long after the electric telegraph had been installed in other parts of the country. The first manager was Lieutenant B. L. Watson, R.N., and the first apparatus consisted of three pairs of semaphore arms on a single mast. In 1851 Watson bettered himself by organising other telegraph lines in other parts of the country on a commercial basis; then the Holyhead line devolved upon another

naval officer, Lieutenant William Lord, who much improved it, the stations now being more numerous and equipped with two lattice masts side by side, each carrying two pairs of semaphore arms. The line ran right across Anglesey and spanned Beaumaris Bay, the estuary of the Dee, and the river Mersey, the last station but one being on Bidston Hill near Birkenhead. Four of the stations are still standing in good preservation; four others are more or less ruinous, and of three more there is no trace to-day.

The term "semaphore" for a telegraph station has been very loosely and unintelligently used in the past, but it is as well to remember that the word was first coined by the French in 1801 to describe the apparatus that they set up all along the coasts of France and her dependencies. It was not until the year 1810 that semaphores were definitely introduced into England, when the various stations along the east coast were first converted from the old system of signalling with flags and balls, into semaphores consisting of a single post with three separate arms.

At a period when so many different inventors were striving to produce a telegraph that could be easily operated, it is strange that the semaphore introduced by Colonel Pasley of the Royal Engineers was received so reservedly, for its simplicity made it far more valuable than any of the other complicated methods. After several experiments his machine finally ended up in 1822 in the well-known form adopted nearly all over the world. It was only in 1943 that mechanical semaphores on Pasley's plan were abolished in sea-going ships of the Royal Navy owing to the need to reduce top weight. Although recognised in 1827, this machine was really intended as a telegraph and was confined to shore stations and harbour flagships, and spelling out a message was of secondary interest partly because some of the letters were not complete; for instance, the setting "13" indicated either I or J, "25" indicated Q or X, and "35" indicated U, V, or W. This explains why the letters J, V, W, and X are to-day not in their right order. It was not till 1874 that Pasley's machine was adopted at sea as a means of conversational signalling, and it was not till about 1880 that anybody thought of adapting the arms of the human body to imitate the arms of Pasley's machine, for, incredible though it may seem, where a small replica of the machine was used, the operator stood behind it and actually grasped its arms with his hands and moved them into position. However, the manual version soon spread and was as often in use as the mechanical, and had the advantage that it could be employed wherever a man could stand up. Meanwhile, after some other experiments with machines on the masts, the truck semaphore was introduced in 1895 by Captain (afterwards Admiral of the Fleet Sir) Arthur Wilson. It was fitted at the main masthead in all men-of-war from battleships to scouts, and consisted of two sheet-metal arms 12 feet long and 15 inches wide. It was capable of being trained round from beam to beam, and was worked by handles at deck level. It was supposed to be exercised daily but was rarely used in real earnest, although it had a horizon range. Wireless telegraphy was beginning to make some headway in 1902, and at first flagships and cruisers were fitted with it. The vertical aerial was suspended from a sort of fishing-rod gaff at the main masthead and for some years shared that position with the truck semaphore, the visual apparatus being retained for the present "in case." Mast semaphores were abolished in 1907.

There was a happy and interesting partnership between the Navy and Army in the persons of two officers, each of whom became most distinguished in his own way. Commander Philip Howard Colomb, Royal Navy, and Captain Francis John Bolton, 12th Regiment of Foot, both great signal enthusiasts, collaborated in 1867 and experimented with numerous different apparatuses for adapting lamps and lanterns to making signals by long and short flashes. On various days in May and June, 1863, each of these officers had delivered important lectures at the Royal United Service Institution, which showed how they proposed to revolutionise the art of signalling in the Services, especially with regard to night-time communication which was in a very backward state. A great deal was said about the incidence of colour-blindness in ratings and other ranks, and Colomb was very keen on having flags whose colour did not signify, but only their contrasting parts. Colomb also had a code of long and short flashes for night lamps quite distinct from the symbols of the Morse system, though of course an adaptation of Morse's original code was shortly afterwards adopted in the Royal Navy as well as everywhere else. In the signal world, indeed, Colomb was chiefly famous for his "Colomb's Flashing Signals". There was a machine rather like a musical box which could be set with the signal pendant numbers of any ship, and only an inexperienced rating was needed to turn the handle, and the apparatus would continue to flash the pendant numbers until the ship's attention had been gained. In earlier days Colomb had been flag-lieutenant to Sir Thomas Pasley and Sir Thomas Symonds, successive admirals-superintendent at Devonport dockyard, and it is said that this was the turning point in his career, and the subject of signals then "grew on him". Colomb's emergency system of lighting Her Majesty's ships internally by candles in huge brass lamps still persisted at the beginning of the present century, and he was afterwards well known as an inventor of all kinds of naval improvements; he reached the rank of vice-admiral. Bolton's chief contribution to the modernising of signalling was his successful use of the lime-light for his flashing apparatus. He and Colomb jointly produced the "Army and Navy Signal Book" used with advantage in Abyssinia in 1867, and Bolton later became an instructor of signalling at the Royal Engineers school of engineering at Chatham, was a colonel in 1881, and was knighted in 1884.

About the year 1853 a new system had been invented and introduced into the Royal Navy, known as Redl's Cone Telegraph, and it seems to have had quite a successful career. It consisted of four enormous black canvas cones arranged vertically, with the bases of each pair together. The bases were formed of large hoops, and by means of light ropes the cones could be made to shut up into the hoops. Thus from one to four cones could be used in fifteen combinations. Colomb's idea was to improve on Redl's arrangement but in this case the closing and opening movements of the apparatus were imitative of the long and shorts made by a lamp, and only one shape was required. This was a large canvas drum which could be completely collapsed. A reporter on the staff of "The Times" newspaper at the 1888 naval manoeuvres referred to this as "a curious ugly-looking black object . . . canvas painted black which opens and shuts like a magnified Chinese lantern".

Another of Colomb's inventions was likewise applicable to flashing

signals; it was a frame containing a number of pivoted slats, exactly like a Venetian blind. The mechanism could turn all the slats simultaneously to appear edge-on to the observer; or flatwise, when of course the opening in the frame would be obscured. Many years afterwards this plan was applied to searchlights and other lanterns in the navy, and was known as Scott's Shutter, having been revived by Captain (afterwards Admiral) Sir Percy Scott, who thus took the credit for an invention which had actually been made years earlier by Colomb.

The Russian War of 1854-55, coming almost midway between the battle of Trafalgar and the great twentieth-century reforms of the fleet, serves also to mark a halfway place in the advance of visual signalling, from the time when it first became reliable up to the time of perfecting it. There was still no semaphore or Morse ship-communication, but flag hoisting had come to fill all requirements by day, and the use of the vocabulary signal book met all conversational needs. *A propos* some N.A.T.O. exercises, and the necessity for inter-allied signalling, it was stated in the Press last year that the breakdown in signal communication between the Allies in the Crimea, gave rise to the formation of the International Code. This is not true, for the original Commercial Code was entirely a British product and no foreigner sat on the committee; nor do the signal arrangements seem to have been at fault; at the time, Captain Charles de Reynold-Chauvancy's book (commonly known as Reynold's Code) was in use by the Allies and there is no reason to doubt that it was successful. Its popularity is proved by the large numbers of the book still extant.

The standard of visual signalling in some of its methods probably reached its zenith in the Royal Navy during the period 1890 to 1910. A great deal of attention was paid to it, flag-signalling in its speed, accuracy, and scope has reached its peak; the mechanical semaphore was at its best, and it was no rare thing to see a flagship making a "General E" (or general semaphore signal) with no fewer than four machines wagging their arms rapidly at once, probably reinforced by several ratings making the same signals with hand flags. The rank of Signal Boatswain was created in 1890, the first batch of eight of these valuable officers being appointed on March 6.

It was customary in a flagship for a signal to be sent up with the flags rolled in small bundles, so that it was impossible to see their composition, and the signal would then be "broken out" and its purport sprung upon the fleet. This was a most striking and spectacular operation, and seems to have impressed that fine descriptive writer Major-General Sir Ernest Swinton, where in one of his books he speaks of "thick clusters of smoke-puffs, suddenly breaking out like signal flags from the halliards of a ship, showed where shrapnel shell were raining down destruction." During the last decade before the War of 1914-18, the breaking out of flags was discontinued except for certain minor signals purposes.

The gradual decay of flag signalling may be partly attributed to the inception of wireless-telegraphy, but much more to the installation of portable electric Morse lamps in profusion and of many different kinds and sizes, which could be used as much for daylight signalling as for night. The well-known Aldis lamp is a case in point of an apparatus introduced during the 1914-18 war. With regard to wireless-telegraphy, although in a rudimentary state, it had become firmly established when hostilities

broke out, transmitting sets being confined to spark oscillators, with buzzers for shorter distances, and presently a few on the Poulsen continuous arc system. Receivers were still mostly of the crystal form, and thermionic valves either for receiving or transmitting were almost unknown in the fleet in 1914 and 1915.

One of the greatest difficulties about W/T in the early days of the 1914 War was the shortage of wireless ratings. A separate branch had been instituted only in 1906 and numbers were lamentably inadequate. Ratings had to be transferred quickly from other departments which, too, could ill afford them, and these novices had to be trained in the ships of the Grand Fleet; at Scapa, the fleet's northern base, a requisitioned merchant ship named "Sokoto" was used as a wireless school to which ratings were lent while their ships were in harbour. A similar day school for junior wireless ratings was opened in the basement of Admiralty House, Sheerness.

By the beginning of the 1914 War, great proficiency had been attained in manoeuvring the fleet by short-range wireless, and this proved of great assistance at night or in fog. It was often practised in the daytime also, and the sight of twenty-four heavy battleships performing equal-speed and alter course tactics without any apparent signalling was certainly a remarkable experience. The signals could be passed in a matter of seconds, especially in a smaller squadron of six or eight ships; no preliminary warning was needed except perhaps the precaution of ordering a "reliable rating is to assume operator of the watch." The equivalent of the flags that would be used was passed in Morse by buzzer to the auxiliary wireless cabinet, and immediately retransmitted. Ships answered in an abbreviated form in an arbitrary order, and in a few seconds the letter "D" ("received") would be buzzed back to the bridge. As soon as the manoeuvre was to be executed, a long dash was sent by buzzer to the wireless operator, and the transmission relayed immediately.

The art of coding and decoding messages was from the first classed as one of the signal department's duties, but as in war time signal ratings could not be spared for this work, and as wireless ratings were deplorably scarce, some other plan had to be thought out. The scheme was to employ in war-time such ratings as were not occupied with other tasks when the ship was at sea. Needless to say it was wireless messages that had to be coded, and the necessity did not arise until wireless began to be well established. It was in 1910 that the amazing idea was formulated of having as coders some of the artizan class, such as the blacksmith and the plumber and their mates. When their instruction then began it was found (not unnaturally) that they were unaccustomed to clerical work and were sometimes hardly skilful at writing even the necessary block letters. At the outbreak of the War of 1914-18, coding was of the crudest description, and any intelligent schoolboy could have decoded a British naval message after very short practice. The code to be used by destroyers, for instance, depended on a simple transposition table applied to a spelt-out signal in plain language; that is, the message was written out in ordinary prose, divided into five-letter groups and changed by substituting letters of the alphabet in an arbitrary order. For example, E was coded by T, and T by E; so the recipient had only to observe that T occurred more frequently than any other letter to determine that it stood for E; and so on. The

original idea of employing ratings for coding not otherwise occupied when the ship was at sea (fortunately taken out of the hands of the artisans) was extended to having bandsmen for the purpose. These men usually quickly learnt the art and proved fairly proficient. In the "Dreadnought" the chief coder was the bandmaster, and it can be put on record that this warrant officer completely mastered the subject, became a real expert and was as much interested in it as he was in music. Whatever changes and complications were resorted to in the 1914 War, cyphers as well as codes are known to have been completely useless as regards security, but undoubtedly the same can be said of the enemy's efforts. One has only to read the Battle of Jutland Official Despatches to realise that the British Admiralty were reading and decoding as soon as they were received, whatever wireless transmissions were being sent out by the Germans, leading up to the battle.

Throughout the war, when the Grand Fleet was at sea, it was essential that the C.-in-C. should be able to receive messages from the Admiralty and bases without the necessity of answering them, and thus giving away his position to the enemy by means of German directional receiving stations. With wireless not in an entirely reliable state, a transmission might in exceptional circumstances fail to get through. There was therefore a scheme of signalling known as the "Intercept" or "I" method, whereby two harbour ships at Invergordon and Scapa respectively, exchanged programmes every four hours, or perhaps more frequently, but always at regular times. They were of sufficiently high power to reach the C.-in-C. in the North Sea or wherever the Grand Fleet might be operating. As often as not these transmissions were dummy messages, and the volume of traffic was kept up even when the fleet was in harbour; but in the event of a real signal intended for the C.-in-C. at sea, he was bound to take it in, assuming that the flagship's receiving gear was in order, and even this was safeguarded by some other ship in his squadron acting as a stand-by guardship on the "I" method wave-length. Examples of these can be seen in the voluminous appendix (II) of messages, contained in the Battle of Jutland Official Despatches; for instance, at 9 a.m. on May 31, 1916: "Rear-Admiral, Scapa to Rear-Admiral, Invergordon: for C.-in-C. Weather report . . ."; and at 4 a.m. on June 2: "R.-A. Scapa to R.-A. Invergordon: for C.-in-C. Visibility ten miles."

HILARY P. MEAD

## II. MODERN DEVELOPMENTS

A MAJOR FACTOR in enabling the Royal Navy, ever stretched beyond its means, to perform its multifarious tasks with efficiency, has always been good communications, formerly provided by frigates and now mainly by Wireless Telegraphy, which, by bringing news speedily to the Admiralty and Commanders-in-Chief and conveying their orders equally swiftly, permit the rapid concentration of forces in vital areas and their employment to maximum effect.

Before the 1914/18 war the use of Wireless Telegraphy in the Navy was in its infancy. The Wireless Branch itself was only introduced into the

Service in 1906 when it was formed out of an assortment of Signalmen and Marines who possessed boundless faith and enthusiasm but only the barest minimum of technical knowledge. Not unnaturally, Wireless Telegraphy was regarded by the rest of the Navy, with considerable suspicion, as a black art.

The development of modern Naval signalling falls naturally into four major phases:

- 1914-1918. The growth of Wireless Telegraphy from a somewhat troublesome infant into the backbone of Naval strategic communications and a useful adjunct to Visual Signalling for tactical communications.
- 1918-1939. Assimilation of lessons learnt in the War. Consolidation in slow time and improvement of all standard Signal Books, equipment, and methods used for signal communications. Conception and initial establishment of the Naval World Wide Strategic W/T Network.
- 1939-1945. The impact of Voice Wireless (R/T) and the consequent growth of functional circuits manned by non-communication personnel. Orientation of Fleet Wireless Organisation to the dominance of air power. Improvement in Inter-Service co-operation. Development of Amphibious Operations communications technique.
- 1945-1953. Assimilation of lessons learnt during the War. Consolidation and improvement of Signal Books, equipment, and methods. Establishment of Western Union and then North Atlantic Treaty Organisation and consequent standardisation of communication books, organisation, methods, and procedure.

### 1914-1918

At the outbreak of the 1914-1918 war Wireless Telegraphy, though regarded as a reasonably reliable method of communication for messages not requiring instant action was not accepted as being suitable for tactical control of the movements of a large Fleet, nor for passing urgent information about the enemy in close proximity in sufficient time to be of value. Visual Signalling, by flags, semaphore, and signal projector, had, by centuries of domination, constant practice, and the ever pressing needs for results, reached a very high peak of efficiency indeed. Large visual signalling staffs worked extremely hard transmitting and receiving the many signals required to effect tactical control of the fleet at sea. The potentialities of Wireless Telegraphy were, however, soon seen by those responsible for naval communications, and progressive improvements in personnel, material, codes, methods, and procedures soon raised the standards of W/T efficiency to a state where it became fully recognised as a speedy and effective method of passing signals over short or long distances. At the end of the War the Fleet Flagship was required to keep constant watch on no less than 7 separate wireless circuits, the Battle Cruiser Flagship on 6 circuits and so on down the line—a situation conceivable only to the most advanced thinkers of 1914.

Visual Signalling did not, however, suffer at all from the advance of its colleague, since progress in Wireless Direction Finding technique kept

pace with the development of wireless itself, and "Wireless Silence" soon became mandatory at sea except when the over-riding need for speedy long distance communication outweighed the consequences of interception and location by the enemy. Consequently tactical control of the fleet at sea remained firmly in the hands of the visual signalling staffs. It is of interest to note here that during the most intense phase of the Battle of Jutland, after wireless silence had been abandoned, the Battle Fleet was making visual signals at six times the rate of wireless signals.

### *I-Method*

The need for wireless silence at sea brought with it the requirement for some organisation by which messages could be passed to ships at sea without obtaining a receipt from them but with complete confidence that they had reached their destination. An organisation known as "*I-Method*" was therefore evolved. It involved shore W/T stations or suitably situated ships transmitting messages to each other using a frequency on which the ship or ships concerned were keeping watch so that these messages could easily and reliably be intercepted by the addressees without any need for them to answer. The receiving W/T Station, of course, made certain that the message was comprehensible and normally transmitted it back to give the listening ships a second chance. In certain circumstances one W/T Station only, fitted with specially powerful equipment, would be used to broadcast the message several times. *I-Method* was, however, the primary service during the War and on the whole it worked very well. There were very few cases of messages not being received and therefore the whole war W/T organisation of the fleet became based more on reception than transmission.

### *Inter-Service Cooperation*

With certain geographical exceptions, inter-Service cooperation never became a major problem in the communications field. A "W/T Board" was, however, established in 1914 to act as a clearing house for all inter-Service communication matters and also to act as a link with other W/T agencies for such items as frequency allocation, etc.

## 1918 - 1939

Steady but slow progress was made in providing the fleet with the wireless equipment which was now accepted as necessary and in improving all standard methods of signal communications rather than replacing them. Efforts were made from time to time to produce efficient Voice Wireless, but as the Navy, unlike the R.A.F., never really believed in this medium, satisfactory equipment was not, in fact, developed in peace time.

### NEW SIGNAL BOOKS

Among the first major objects for modernisation were, of course, the Signal Books, by means of which the fleet was controlled, the shortcomings of which had been thoroughly shown up during the War. New Signal Books had been issued to the fleet at irregular intervals for hundreds of years but it was interesting to note that the 1914/1918 War was fought using the books basically the same, though considerably amended,



as those first issued in 1827. Furthermore, the principles and methods of flag signalling laid down in 1889 had also survived with slight alterations.

A special high-level Signal Book Committee was set up to study the problem and after some years of labour produced a completely new set of books which incorporated all the lessons learnt during the War. Progress in tactical thought, however, had outrun their work and this set of books was soon found to be inadequate. The process was therefore repeated once more and in the mid-1930s a further new outfit was issued to the fleet. It can well be imagined the effect that these constant changes had upon the fleet in general and the Signal Branch in particular. It did, in fact, become a gibe against Signal Officers that new books were only produced in order to enable yet more signal officers to catch the selectors' eye and gain promotion. The new set of books, however, were based upon an entirely new conception which has survived the test of time, in that they all based upon one master Bridge Book, called the "Conduct of the Fleet." This book contained inside one cover all matter pertaining to the conduct, manœuvring, and handling of the fleet at sea; information which had previously been scattered about in many other books, Signal and otherwise.

#### WIRELESS ORGANISATION

All wireless organisations, large and small, were consolidated and steadily improved upon. W/T itself, in addition to holding undisputed sway for long distance communications not already provided by cable, also became firmly established in the fleet for manœuvring, gunnery control, and ship-air circuits. Peace-time fleet training concentrated mainly upon the wireless organisation required by a "Grand Fleet" and was orientated towards reports of visual contacts, large scale surface engagements, massed destroyer attacks, night action, and reorganisation after major action. The efficiency of wireless direction-finding had been well proved in war, and wireless silence remained the rule at sea during all major exercises. Thus, despite the availability of an efficient auxiliary short-range wave for manœuvring purposes, visual signalling retained pride of place as the primary means of effecting tactical control. Visual signalling efficiency was therefore maintained at its extremely high level.

#### NAVAL STRATEGIC WORLD-WIDE WIRELESS NETWORK

The lessons of the war made it quite clear that our Imperial commitments demanded the absolute guarantee of rapid communication with and from any warship anywhere in the world. It was thus essential to cover the oceans with broadcast and/or I-Methods using Naval W/T transmitting stations, interconnected by cable or wireless point to point circuits, all controlled at Whitehall. Ship-Shore W/T receiving stations were also needed to ensure that any ship calling from sea would, with the minimum of delay, have its message accepted by some station which would then assume responsibility for dispatching the message to its final destination via the Naval network. For example, owing to the vagaries of wireless wave propagation a message from a frigate in the Persian Gulf calling Ceylon might easily be accepted by Malta, which would

then pass the message to Ceylon via Whitehall. The plan involved vast expense on the construction and equipment of powerful W/T Stations all over the world—in Malta, in the jungles of Ceylon and Singapore, on an island in Hong Kong Harbour, to name but a few. Steady progress was made, however, limited only by financial stringency, so that when peace came to an abrupt end the establishment of the world-wide Strategic Naval Wireless Network, though by no means complete, was well advanced.

#### MERCHANT NAVY W/T

Efforts were made by the Admiralty in peace time to prepare for adequate communications with merchant shipping in war, when world-wide facilities would also be required for them. Merchant ships, on the whole, were equipped in peace time with the minimum equipment needed to comply with International Regulations—a quite natural circumstance in such a highly competitive business. All maritime nations maintained their own chain of coastal wireless stations which kept watch for distress traffic and effected the exchange of radio telegrams. In addition, the United Kingdom possessed a really powerful W/T Station at Portishead which was used for long-distance communication with certain liners.

An embryo broadcast organisation was designed for use in war and in exercises with British merchant ships twice a year for short periods. Unfortunately, the lack of Admiralty responsibility for the Merchant Navy meant that only advice could be given and this advice, which in turn meant expense, was rarely taken. Thus, in 1939, the numbers of Merchant Navy operators available and the general standard of equipment fitted were far below that needed for effective war time control.

#### INTER-SERVICE CO-OPERATION

Inter-Service co-operation, between the wars, was the subject of fair words and promises and excellent intentions, which achieved negligible results. The main stumbling block to full inter-Service co-operation in communications lay in the basic difference in conception in all three Services of the functions of various signal organisations and particularly in the status and employment of their officers. For example, only in the Navy were signal communication officers always an integral part of the planning staff and thus fully aware of the inception of all new projects from the very outset. There is a world of difference between this attitude and one which regards a signal officer as a man who controls the organisation which delivers a message from A to B after it has been inserted into the machine.

Navy-Army co-operation rarely loomed at all large, as amphibious operations were practically never practised other than as major staff exercises and thus deficiencies in communications could easily be glossed over by those in charge of the exercises, if, in fact, they were ever brought to light. Navy-R.A.F. co-operation was always closer, since the war plans of both Services envisaged close co-operation between warships and Coastal Command and also some naval communication with Fighter Command.

The W/T Board, established in 1914, continued in being throughout

the years of peace, but its powers proved too limited for it to exert enough influence. More initiative on its part in persuading the three Services to accept common communication methods and procedures would have obviated a host of difficulties which arose in the Second World War. Off-shoots of the W/T Board, set up wherever the three Services were established in the same area, however, achieved considerable success in the solution of local problems.

#### LINE TELECOMMUNICATIONS

Line telecommunications was a subject very low on the Navy's peacetime priorities. At this time the emphasis of naval communications was laid entirely upon the tactical needs of the fleet at sea, supported by the strategic W/T network. Personnel were highly trained in the complementary arts of visual signalling and W/T, and although the existence of supplementary forms of communication ashore was not entirely excluded, their importance and potentialities were never properly appreciated. It was rather assumed that somebody else would provide them as and when necessary. This attitude was generally influenced by the fact that all naval land-line requirements in the U.K. were usually met in peace by the efficient General Post Office, control in detail of telephones for Shore Headquarters, Dockyards, etc., were entirely in the hands of a Dockyard Department, and the meagre naval needs on foreign stations were comfortably handled by the Army Signals organisation.

The first major step towards modernising the Navy's land-line organisation was taken in 1937 when it was agreed in principle that teleprinter services should be set up between the Admiralty and all major Commands in the United Kingdom. Naturally no trained operators were available but thanks to the willing assistance given by the G.P.O., operators were, in fact, trained and produced in time to man the new circuits.

A warning note was occasionally sounded abroad, but fell upon deaf ears; in times of local stress, the conflicting priorities for scanty L/T facilities inevitably meant that the Navy, owning none of them itself, had to do without.

#### 1939 - 1945

##### *Voice Wireless (R/T)*

Apart from the meteoric advance made by radar, a toy in naval eyes before 1939, which is not within the compass of this article, the outstanding development in the electronics field from the naval point of view was undoubtedly the enormous expansion in use of Voice Wireless (R/T) circuits for tactical communications in the fleet. The peace time conception of a "Grand Fleet" W/T organisation soon underwent a radical change. The small size of fleets, and the rarity of major surface action, reduced many old requirements, whilst the growth of radar demanded a variety of circuits for the interchange of plots and for general intercommunication. Furthermore, the increase in naval air strength forced the creation of a flexible wireless organisation so that many squadrons in the air could be controlled simultaneously. To meet these pressing demands, therefore, "functional" voice circuits mushroomed into a predominant place in the Fleet W/T Organisation. As these voice circuits could be operated efficiently by those with no knowledge of



Headquarters of Mediterranean Naval Command established in Malta. Unfurling Flags of N.A.T.O. Nations  
(Associated Press Photograph)



morse, and as war inevitably brings with it an acute shortage of trained communication ratings, a high proportion of the new functional circuits were soon manned by officers or seamen of the "user" branch (e.g. Navigation, Direction, Gunnery).

Furthermore, voice circuits quickly become quite indispensable for manœuvring and emergency signals as they gave a reliable and speedy means of passing instructions to, or receiving tactical information from, all naval units within Voice Wireless range but at a range where Visual Signalling was subject to considerable delays, particularly during bad weather. The larger and less concentrated the unit, the worse the weather conditions, the greater the advantage. At this stage of its development, it was considered that Voice Wireless could be received at horizon range only and thus, providing the warships concerned were far enough from an enemy shore, it was not liable to interception or D/F. In any case, the need for reliable and rapid intercommunication in naval units of all sizes was considered generally to be more important than the faint possibility of reception by enemy stations. Naval units thus proceeded all over the ocean, using a variety of Voice circuits, though of course not W/T circuits, with complete confidence and impunity.

#### DECLINE OF VISUAL SIGNALLING

Visual Signalling, even more than other methods of communication, is entirely dependant upon consistent use under all weather conditions for maintenance of efficiency. It cannot, of course, normally compare with Voice Wireless for speed and the facility of general promulgation, with the exception of flag signalling when ships are in close company, and the impatience of senior naval officers naturally caused the slower medium to be neglected. Lack of practice, in turn, sapped confidence and decreased efficiency, which in turn increased delays. A vicious circle indeed! The supersession of Visual Signalling by Voice Wireless as the primary means for tactical control of the fleet at sea was also hastened by the influence of the U.S. Navy, who, never very fond of Visual Signalling, had changed over wholeheartedly to Voice Wireless several years before.

Naturally, under these adverse conditions the general standard of flag signalling in the Royal Navy took a sharp fall, from which it has not fully recovered to this day, although in modern practice this means of controlling the fleet at sea is now returning to its primary position. Having once accepted the need for a multitude of tactical voice circuits, ships of the Royal Navy were soon adequately equipped to compete with all requirements of the European War. It was a sad awakening, however, when the well-equipped British Fleet, sent to operate with the U.S. Navy in the Pacific in the later stages of the war, found itself woefully under-equipped in voice channels by the standards of its U.S.N. counterpart.

#### WIRELESS ORGANISATION

As the war progressed, the size and complexity of Task Forces increased and these circumstances led once again to the adoption of a "Grand Fleet" wireless organisation, but this time one which was fully orientated towards the dominance of air power and the needs of radar. Furthermore

Task Forces, particularly in the Pacific, tended to operate farther and farther from bases and for periods unheard of before the war, a situation which produced an enormous quantity of administrative traffic, most of which was in code.

As a means of shore-ship communication, the I-Method was soon found to be inadequate to handle the heavy traffic in operational areas. Direct working was normally precluded by the need for W/T, as opposed to Voice, silence at sea. The solution was found in the general adoption of multi-frequency broadcasts giving full area coverage, in which every message was transmitted once as soon as possible and repeated several hours later so that ships that had missed it or read it incorrectly could have a second chance. In some areas the W/T traffic was so heavy that a variety of additional circuits had to be provided to meet the special needs of High Command, administrative, and meteorological traffic. For example, the great distances involved and the duration of missions in the Pacific involved some flagships reading no less than five broadcasts simultaneously throughout the 24 hours.

The inception of this scheme, however, lagged behind its conception, for the chain of Naval W/T Stations planned in peace time to girdle the world and cover the oceans was for long inadequate both in numbers and equipment to fulfil this task. Pressure of war and the relaxation of purse strings, however, worked wonders and well before the end of the war the master plan had been fulfilled and practically all shore-ship services were being run on simple and effective multi-frequency broadcasts.

#### BRITISH-AMERICAN NAVAL CO-OPERATION

Close tactical co-operation between the Royal Navy and U.S. Navy brought immediately in its train apparently insoluble communication problems. Not only were there radical difference, in the employment of personnel, the methods procedures, and signal books to be used, but even the suits of signal flags standard in the two Navies were totally different.

A temporary war time solution was found by agreeing that ships of the visiting Navy would adopt, lock, stock, and barrel, the flags, books, and procedures of the Navy in whose sphere of influence the operations were taking place. It was, however, quite obvious that this major problem would require a permanent solution when time and circumstances permitted.

#### PRESS

In the Silent Service the word "publicity" had traditionally been coupled with the adjective "undesirable". However, there is no doubt that from the naval point of view the press came into its own with a vengeance during the Second World War. The imperative need for quick release to an insatiable world public of detailed information about all naval actions, however small, became widely recognised as an important factor in the maintenance of public morale. It thus became necessary for ships to prepare press releases at sea, censor them, and then clear them by W/T. No additional personnel, wireless circuits, or equipment could be provided and existing facilities, already stretched to the limit, had to be pushed just a little bit further to meet this additional priority requirement.



## LOCAL COMMUNICATION ORGANISATION

Local communication organisations expanded out of all recognition as the war progressed. Whereas at the outset a small port had been accustomed to operating one W/T circuit in collaboration with visual signalling from a Signal Tower and a Port War Signal Station, it soon became necessary to provide wireless facilities to compete with many and varied operational needs. The degree of complication naturally varied with the operational importance of the port and the circumstances obtaining at the time, but as a general rule special circuits had to be provided for some or all of the following:

- (a) Minesweepers.
- (b) Ships in Harbour.
- (c) Air Defence.
- (d) Air-Sea Rescue.
- (e) Harbour Defence Craft.
- (f) Coastal Forces.
- (g) Exercises.

## CAPTURED PORTS

When the tide of war began to turn, the Navy found itself occupying, at regular intervals, a series of ports captured from enemies or reluctant Allies. Sad experience in Norway, France, and Madagascar soon taught us that the naval communication requirements of a captured port were as heavy as one which had been in our possession for years. Furthermore, as they would normally be in a forward area, under constant threat of attack at all times, their line communications would inevitably be inadequate even for priority traffic, so that adequate W/T facilities were an immediate need. In 1939 any suggestion that the Navy would ever need motor vehicles fitted with communication equipment in a manner similar to the other Services would have been laughed to scorn. Very few years later, however, the Navy had recognised the fact that the necessity quickly to establish Naval W/T Stations of all sizes in ports or areas captured from the enemy demanded the instant availability of enormous quantities of transportable communication equipment.

## "MOBILES"

Suitable containers were therefore fitted with wireless, cryptographic, and message-distribution equipment and mounted on small iron wheels to give them just enough mobility to be towed from wharf to the site of the W/T Station. This arrangement proved of value but experience soon showed that in order to establish a W/T Station ashore with the minimum of delay all containers had to be really mobile and be capable of being driven ashore over the beaches or of crossing really bad terrain. Containers were therefore modified in size so that, whilst still holding the necessary communication equipment, they could be mounted by crane on to any standard 3-ton truck. It then, for example, became possible to send hundreds of containers to distant theatres and to supply the motor vehicles necessary to transport them from within the distant theatre itself. Some over-sized specialist vehicles were, however, still required to carry the enormously powerful wireless transmitters which were used to provide



the major fixed services and area broadcasts. This mobile equipment was sub-divided into units of various sizes each designed to provide the communication facilities of a port of specific size, called by the rather attractive names of, for example, "Momonster" for a major port commanded by a Flag Officer in Charge, or "Mominor" for a minor port with a Resident Naval Officer only.

#### "MONABS"

In 1944 it became an urgent matter to provide suitable radio vans in large quantities for mobile naval airfields. It was found possible to use some of the standard types already designed for port parties but many new containers had to be constructed to provide for navigational aids, V.H.F. D/F, aircraft direction, etc. Nine complete "Monabs" were, in fact, sent out to the Far East where they proved absolutely invaluable as the tide of war swept steadily eastwards.

#### OPERATIONAL SIGNAL EQUIPMENT DEPOT

The maintenance of these enormous quantities of mobile equipment, all of which had to be ready to operate at short notice, meant that the normal Naval Store issuing procedure had to be by-passed in their case. Instead, therefore, of a piece of equipment being issued by Naval Stores to the user in several pieces—possibly with a notation that one item as vital as the remainder was temporarily out of supply—"Operational Signal Equipment Depots" were established in U.K. and abroad where it was made quite certain that every item of mobile equipment, and, in fact, all communication equipment used in amphibious operations, was placed in the hands of the ultimate user in a good state of maintenance and ready for immediate operation.

#### MERCHANT NAVY W/T

The impact of war immediately disclosed the major deficiencies in our Merchant Shipping W/T organisation. Though correct in planning and principle, defects in material, personnel, and training made this organisation quite inadequate for the clearance of vital traffic at a reasonable speed. There is little doubt that some shipping casualties which occurred in the early stages of the war were directly attributable to the non-receipt or delay in receipt of urgent messages. The progress of the Battle of the Atlantic in particular completely revolutionised the W/T outlook of all concerned. The "W/T Guard" system proved inadequate and all naval escorts, however small, soon had to be equipped and manned to read the Area Broadcast at all times. Facilities had also to be provided for voice communication with aircraft escorting convoys and between naval escorts and convoy Commodores.

The manœuvring of convoys was conducted in the main by flag signalling and it became necessary to provide as staffs for Commodores and Vice Commodores large numbers of trained signalmen. These ratings, though thoroughly efficient for convoy signalling, were not trained up to Fleet standard, in order to economise in time and training facilities. They were therefore known as Convoy Signalmen. At the later stages of the war yet another grade of signalmen, this time with even less training, was

produced for certain other specific ships in convoy, for example Rescue Ships. They were known as Convoy Signalmen (N.Q.).

Ships in convoy with long distance messages to send passed them through the escort who would transmit to shore when circumstances permitted. Independently routed merchant ships were allowed to work direct with Portishead and later through a ship-shore service common with warships, which effected a great improvement in their communications. A few very large fast troopships, such as the Queen Elizabeth and Queen Mary, which normally sailed unescorted, were known as "Monsters" and conformed to a special W/T organisation of their own. They were provided with adequate complements of wireless operators and Naval visual and cryptographic personnel. They were, in fact, the only ships in which W.R.N.S. officers and ratings went regularly to sea as part of the ship's complement. Improvement in Merchant Navy communications, though never spectacular, was steady throughout the war as more and better W/T stations became available, modern equipment was fitted in merchant ships, and adequate numbers of operators both wireless and visual were provided. Better means of protecting convoys were constantly being devised, each of which produced their own communication problems. For example, convoys near U.K. always suffered heavily from enemy air attack. Arrangements were therefore made for certain R.A.F. Stations to keep special W/T watch which allowed escorting ships to call direct for air cover and to be informed when to expect it. This service helped considerably to reduce casualties and thus enhanced morale.

Admiralty control, of course, lapsed with the end of the war but Admiralty interest is looked after by the Shipping Defence Advisory Committee, a body formed before the War to advise the Government in peace of essential features which should be incorporated in merchant ships to improve their safety in war. Furthermore, by agreement with the G.P.O., radio telegrams to and from warships and merchant ships all over the world are passed via the Naval Strategic Network, thus maintaining tradition and training of merchant ships in addition to providing satisfactory traffic levels on these circuits.

### INTER-SERVICE CO-OPERATION

Possibly in no other general field of communications were greater strides made during the Second War than that in inter-Service co-operation.

#### NAVY/R.A.F.

Purely Navy/R.A.F. inter-communication was initially unsatisfactory, although the common methods evolved in peace and the basic organisation were satisfactory. Practical results fell below those required owing to lack of realistic inter-Service training in peace and shortage in personnel and equipment. Results improved rapidly with operational experience and co-operation at high levels was ensured by the establishment of Area Combined Headquarters (now known as Maritime Headquarters) where the Naval and Air staffs, at all levels, worked cheek by jowl and where W/T communications of both Services were sited adjacent to each other.

## AMPHIBIOUS OPERATIONS

Amphibious operation communications which had hitherto been Army/Navy only now became, with a vengeance, a matter for three Services. From the initial establishment of Combined Operations Headquarters, which had strong signal representation from all three Services, solutions were steadily found to all problems of every kind.

## ASSAULTS

Assaults fell broadly into two types. The short-range assault, where High Command could be exerted from shore Headquarters, and the long-range assault where an ocean passage was involved and a three-Service High Command had to be established afloat. The short-range assault, other than of the magnitude of Normandy, presented a reasonably simple problem in that satisfactory shore Headquarters could generally be made available by the rapid expansion of existing large scale naval W/T facilities. For example, Headquarters at Portsmouth, Gibraltar, and Malta were all used in turn without major alteration.

The Command and communication problems attending long-range assaults were, in turn, solved by the bold abandonment of the generally held view that a large warship, the flagship of the Naval Force Commander, should be used to accommodate the three Service Commanders of the assault. Experience in early Combined Operations such as Dakar soon showed that a warship was by no means the right choice, not only because of limitations in space and equipment, but owing to the ever-present likelihood that the warship would, in the course of Naval operations, be forced to leave the combat area, despite the protests of the military and air Commanders concerned.

## FORCE H.Q. SHIPS

Some suitable merchant ships were therefore equipped with the comprehensive communications and operations rooms, offices, and accommodation needed to house the Commanders and staffs of the three Services and to enable them to perform their duties with efficiency. It was fully recognised that Command and communications were the primary role of these invaluable ships and that they were in no way naval fighting units.

## FIGHTER DIRECTION SHIPS

As the extent of the assault organisation progressed it was found that the exacting requirements for communications prevented a Force Headquarters Ship from being fitted with sufficient radar equipment for the effective control of fighter aircraft in the assault area. This control afloat was absolutely essential in a major assault in the early stages before the R.A.F. had established adequate facilities ashore to take over control. It was therefore decided to equip other merchant ships to compete with this task and to accept the principle that full responsibility would be delegated to them, leaving Headquarters Ship exercising only broad direction over the fighter effort.

## MINOR HEADQUARTERS SHIPS

A major landing naturally covered a very wide area and the demand arose for three-Service Headquarters Ships at various lower levels. Once again suitable troop transports were fitted with additional W/T and Operations Rooms but in this case the expedient proved unsatisfactory; the extemporised Headquarters were never adequate and also because the transport itself was too valuable to be left in the assault area. Recourse was therefore had to warships and several destroyers, frigates, and L.C.I.(L) were equipped with additional facilities of varying degrees, and then used to accommodate Joint Army Headquarters right down to battalion level. Despite the cramped space, those small warships proved most successful, the more so as they were available after the Army had landed to exercise naval control of particular phases of the operation, for example, Convoy Assembly and Ferry Control.

## COMBINED OPERATIONS PERSONNEL

Concurrently with the steady progress made in the revision of the necessary Command facilities afloat came the training of communication personnel of all three Services for employment in unfamiliar surroundings. Despite the considerable degree of inter-Service standardisation in communications, methods, and procedures achieved during the War, it was found that the best results were achieved when both ends of a circuit were manned by operators of the same Services, and when responsibility for message distribution was handled on an intra-Service basis. Thus it was that we found airmen and soldiers operating afloat and sailors on the beaches and with the forward troops passing calls for naval gunfire or giving targets to naval aircraft operating in close support of the troops.

## NAVAL LINE UNITS

Assault operations brought an increased awareness in the Navy of the need to take some interest in its own L/T needs. Army signal officers were lent to advise on requirements and means of meeting them and at a late stage of the war it was decided to form "Naval Line Units" of Royal Marines, to cover the essential Naval needs in the early stages of an assault or the capture of a port. Long distance lines, major switchboards, and terminal equipment, however, all remained the responsibility of the Army.

## 1945 - 1953

Once again, immediate steps were taken in all naval communication fields to assimilate and act upon such lessons of the Second World War as lack of time or money had precluded during hostilities. There was little doubt in the minds of responsible Naval authorities that the time had come for radical action to be taken to achieve such degree of standardisation with the U.S. Navy as was practicable. This standardisation, however, easy enough in theory presented considerable difficulties in practice, owing to the vastly different outlook in both Navies over tactical doctrine and the lay-out of signal books. Complete adoption of the U.S. Navy's signal books was not considered feasible and the R.N. therefore re-wrote yet

again its own books, incorporating the lessons of the war, and making these books as similar to those used in the U.S.N. as was practicable. The R.N. adhered firmly, however, to the tried and proved principle of a Master Bridge Book with its satellites.

### FLAGS

On this occasion, however, the R.N. took a major step in scrapping the Naval code of flags which, with minor amendments, had lasted for over 50 years. This code consisted of 86 flags and pennants, in addition to which ships had to carry the International Code of 40 pieces. The new code now accepted by the R.N. was based on the International Code of alphabetical flags and numeral pennants to which was added the numeral flags in use in the U.S. Navy, some special flags and pendants for R.N. employment only. It comprised 78 pieces in all—a vast improvement on its predecessor.

### WESTERN UNION AND N.A.T.O.

The new code of flags and the new signal books were hardly in force when they were overtaken by the rapid march of international events. The establishment of Western Union and later the North Atlantic Treaty Organisation brought tremendous pressure for complete standardisation of communications with and between the armed forces of all member nations. In the naval field the R.N. and U.S.N. soon took the lead, assisted by advice from other maritime nations, in particular France and the Netherlands. With good will on both sides, progress was made at a hitherto inconceivable speed and by 1952 dozens of standard books, known as Allied Communication Publications, had been agreed, translated where necessary, printed in vast quantities, and distributed to and by all major member nations. This year also saw the first major N.A.T.O. Naval Exercises in which vast mixed forces of warships operated together using the same tactical signal publications. It is, of course, fully realised that, in detail, the various communication publications are not completely satisfactory by R.N. standards. There is, however, complete confidence that with the annual series of N.A.T.O. exercises, large and small, which now take place, the force of events and the need to produce results will gradually bring these books into a really first class state.

“BUCCANEER”

## CHAPTER XVII

### LIFE-SAVING EQUIPMENT AT SEA

BY LIEUTENANT-COMMANDER G. W. R. NICHOLL

DESPITE THE inventive efforts of a few individuals, there has until to-day been little real progress in the evolution of life-saving equipment at sea, which in principle remains much what it was a hundred years ago. Yet ideas that appear quite modern will often be found in dusty pamphlets or among the reports of interested bodies of long ago. Recalling the astonishing genius of only one person, Leonardo da Vinci, it would be a bold man who would assert to-day that he has made an original invention. Ideas have never been lacking; it is the means, the technique, of giving them effect that have frustrated hopes. Thus it is that, in spite of great strides in another direction, ship construction, the need to improve maritime life-saving equipment is almost as pressing as ever. Lloyd's Shipping List for the 36 years from 1793 to 1829 shows that there was an annual average of 557 shipwrecks; in 1829 alone over 800 occurred and more than 2,000 seamen perished. Turning to the world of to-day, Lloyd's Register of Wreck Returns lists an annual average loss, from 1946 to 1951, of well over 200 ships of 100 tons gross and above. It might therefore be of interest to lead up to the most recent developments by first tracing the course of early events.

### EVOLUTION OF LIFE-SAVING EQUIPMENT

To-day, an individual inventor cannot usually hope for success without Government or commercial backing; in the past he had to look for a patron or a society. In the late 18th and early 19th century the Duke of Northumberland was an example of the first, the Royal National Institution for the Preservation of Life from Shipwreck of the second; so was the Royal Society of Arts, founded in 1754, which by offering prizes and bringing to the notice of its fellows matters of moment in this sphere also furthered progress. To the Royal National Lifeboat Institution seamen also owe a deep debt of gratitude not only for its wonderful record of lives saved, but because the development of the shore-based lifeboat directly inspired improvements in design of ships' lifeboats. In 1765 the French experimented with what might have been the first "lifeboat", but no practical use seems to have been made of it. The records appear to show that the claims of Lukins of London, and Wouldhave and Greathead of South Shields run very close together, the first in 1785 and the second four years later. The R.N.L.I. has a print showing the "Original", built in 1789 and designated the first lifeboat, pulling bravely into a huge curling breaker to the help of a ship on the horizon.

Greathead, a boat-builder among other things, is reputed to have conceived the idea for a new design when he one day observed the self-righting properties of a segment of a sphere in a bucket of water. Under the patronage of the Duke of Northumberland, he built his prototype,

which was first used on January 31, 1790. Sharp at bow and stern and fitted with air cases and cork for buoyancy, the boat reflected the lines of that segment. With an oar as rudder, steering was possible from either end. The largest boat built measured about 30 feet, was propelled by 10 oars and cost £165. It is noteworthy that the crew, originally equipped with cork lifejackets, abandoned them in preference to relying on the boat's seaworthiness, so confident were they in this quality. The boat was eventually examined by a Parliamentary Committee in 1802 and, after some haggling in the Commons, £1,200 was awarded to Greathead.

The reference to lifejackets indicates that they were apparently an accepted precaution by that time. One Mallison, in his "Observations on Preserving the Lives of British Seamen", discusses the merits and demerits of several types of "life-preserver", and he refers to one made of cork in use in 1766, and to a contemporary (1807) version called the "Seaman's Friend". About the middle of the nineteenth century another pamphlet, with the same humane motive in view, takes up the discussion on still more recent inventions, mentioning inflatable lifejackets, in particular the "Nautilus", a "harmonica-type" specially designed for quick inflation.

And so interest in this subject continued to mount; individuals or societies voiced their opinions, frequently in the forthright manner of the time. Inventors endeavoured to obtain favourable views of their devices, but co-ordination appeared to be lacking. The Rev. James Bremmer had a plan for converting ships' boats into safe lifeboats in 1809; James Mather of South Shields already had ideas on patent disengaging gear in 1826, a subject taken up by Captain Kynaston, R.N. thirty years later. Perry, an American, produced a metal raft of cigar-shaped tubes, some being made in this country by a Captain Cornish. Another American invention, a survival suit, was also introduced here. The Great Exhibition of 1851 had many ingenious marine devices on view, including one which a catalogue in the library of the Royal Society of Arts delightfully describes as "A nautical cap which can be immediately converted into a safety swimming belt".

#### OFFICIAL ACTION

Official notice began to be taken. In 1854 the Marine Department of the Board of Trade ordered all sea-going ships with ten or more passengers to carry lifeboats. Later, an Admiralty Committee sat on the subject of "Lifeboats and Means of Saving Life at Sea", the minutes of which hint at one possible reason why progress in this matter was not viewed with complete favour. Vice Admiral A. P. Ryder had suggested in a treatise that seamen's hammock mattresses should be stuffed with cork, so that they could be used as lifebelts or rafts in an emergency, but the committee thought this offered too ready a means of escape from H.M. ships by pressed men! This, then, was the manner in which the Ship of Progress made way, seemingly lying becalmed until puffs of public opinion momentarily filled her sails. It must however be added in fairness that in the later part of the last century, what progress was achieved seems in no small measure due to Mr. Thomas Gray, a Permanent Assistant Secretary of the Board of Trade.

## THE TWO WORLD WARS

In April, 1915, the Carley float was introduced into the Royal Navy, and it was to remain the standard raft, with virtually no change in design, for over 30 years. It should be noted that rafts were supplied originally only for that part of the warship's complement in excess of her boat capacity, although it was readily apparent that the chances of safely launching boats were almost nil, most of them being stowed on the centre line.

In the Merchant Navy, on the other hand, the Board of Trade had drawn up detailed regulations on all types of lifesaving appliances, and these shipowners ignored at their peril. While this system had the sound advantage of ensuring a minimum standard of safety in the public interest, it must undoubtedly have done much to stifle individual initiative in a seafaring nation: if no new equipment could be carried unless officially "approved", then no shipowner was going to spend money on what might prove a failure—and, more important, risk inviting unpleasant legal consequences. This attitude is apparent to-day, and commercial concerns in a highly competitive field can hardly be blamed.

Between the wars, the only new equipment officially experimented with in the Navy was the floatanet, which device can only be looked upon as a positively desperate expedient. A neglected sphere is hardly one suddenly to attract attention when a great war breaks upon a nation; nevertheless, the Admiralty did appoint, under Admiral Wodehouse, a Committee to survey existing life-saving equipment in 1939. Their report, as was to be expected, was far from re-assuring: the Pattern 20 Carley Float (holding 12 men internally) was considered the largest that could readily be handled; Denton, Spanner, and Balsa rafts were recommended in addition; the inflated, belt-type lifejacket, hurriedly made a personal issue during the first war, was adversely criticised. It is unfortunate that seamen's eyes were not then upturned to their comrades in the sky, for they had been developing light inflatable dinghies of rubberised fabric for several years. These descendants of the flotation bags used in earlier Fleet Air Arm days, were to save thousands of airmen's lives, from the cold reaches of the North Atlantic and the warm seas of the Pacific alike.

Merchant ships had lifeboats of wood or steel, conforming to the detailed regulations originally laid down by the Board of Trade, the responsibilities of which were transferred to the Ministry of Transport early in the war. Life rafts were mainly of the slatted wooden type enclosing buoyancy chambers; one ingenious though cumbersome version had means for erecting a tent and thereby did good service on many an occasion by protecting the occupants from the full effects of exposure. Of lifejackets there were the "Standard" cork, the "Standard" kapok, and the "Victory".

## A NEW OUTLOOK

At the end of the late war, the Admiralty, perturbed at the loss of life incurred in sinkings, set up a committee of investigation under Admiral Talbot. A comprehensive examination of the whole subject was made, ranging over a wide field and not simply confined to material in this country. From the resultant report, submitted in 1946, some sobering



facts emerged, of which these two might well be italicised : it was estimated that

- (1) Two thirds of the total naval casualties were due to drowning and exposure, and
- (2) Only 10 per cent of Carley floats ever became waterborne.

These figures are a damaging indictment of the past attitude towards this subject, particularly when it is considered what efforts were made immediately before the last war to evolve an efficient damage control organisation that would enable a ship, hit in battle, to remain effective, or at least to live and fight another day. One reason for this failure, the Committee found, was that no Admiralty department was specifically responsible for life-saving equipment, and it was recommended that this oversight should be corrected without delay.

After studying the field of research into survival, including work done by the Germans during the war, it was concluded that three factors in particular vitally affected the survivor's chances: the wind, the sun, and the sea. The first was naturally of greater significance the colder the weather; the second operated in the reverse sense, and the third was, in general, an adverse force wherever the survivor might be, for even in warm waters a man virtually starts to die, for physiological and other reasons, on immersion. It was therefore necessary to find a means which, providing protection against all three factors, would also prove practical in sudden emergencies.

As a result of further investigations, the Committee considered that the type of inflatable dinghy carried by aircraft offered the most promising basis for development in relation to naval requirements. These craft saved many thousands of lives during the war, sometimes under conditions which no conventional lifeboat would have survived; nevertheless, their apparent fragility marked a radical departure from the customary factors of strength employed in naval architecture, and some cautious tests were applied. An inflated dinghy, after being moored close against the side of a ship for 90 hours in half a gale, showed negligible traces of chafing. Another had 2 cwt. bags of pig iron and sand dropped on its buoyancy chamber from a height of 10 or 12 feet without suffering damage. And a third survived a week afloat in water covered with oil fuel. The responsible air department of the Ministry of Supply which draws up very stringent specifications for the manufacturers to follow might be forgiven for regarding these tests as somewhat unnecessary, for prototypes of a new series undergo thorough tests, which include three weeks in full ballast while moored to a buoy in the North Sea. The Talbot Committee recommended that a lifejacket similar to the inflatable "Mae West" used by airmen should also be developed.

The Naval Life-saving Committee was set up in 1947 to give effect to its predecessor's recommendations and to maintain an active interest thereafter in all matters affecting life-saving equipment. Representatives from the Departments of Naval Construction, Naval Equipment, Navigation Direction, Air Equipment, and Medical Director General form this Committee, with powers to co-opt the services of such other departments or individuals as may be necessary; the Officer-in-Charge of the R.N. Safety Equipment and Survival Training School, for example, is a permanent

co-opted member. Work was immediately started and, after many extensive and painstaking trials and investigations under scientific supervision, the new lifejackets and life rafts first started to be introduced as standard equipment into ships in 1952.

### THE LIFE RAFT

The life raft first tested was a modification of the R.A.F. Type "J" 8-man dinghy, which consisted of a circular buoyancy chamber supporting a floor. A telescopic metal mast, supported by guy ropes, to which the four segments of a tent could be attached, was a modification to provide the necessary protection from spray, wind, and sun. The intention was that the raft, packed into small compass in a valise, could be thrown overboard and the operating cord pulled. The raft, then automatically inflating through the release of CO<sub>2</sub> gas from the cylinder underneath the floor, would burst its way out of the valise and be ready for boarding by means of a ladder; the survivors erecting the tent after boarding. However, on the first Arctic trial in 1948, it was found that the "survivor's" hands became so numbed with cold in the first few moments after clambering on board from the sea that he was unable to erect the tent.

It was obvious that some means must be found for automatic erection of the tent, so that the protection so necessary for survival in cold weather would be immediately available. Manufacturers, experienced in designing inflatable equipment for the Ministry of Supply were accordingly invited to submit designs for competitive trials. It had also been decided by the Naval Life-Saving Committee at this stage that an 8-man raft was uneconomically small for most classes of ships. The raft eventually selected had an oval buoyancy chamber supporting the floor with an inflated thwart amidships; two pneumatic arches, inflating with the main chamber, supported the tent. There were openings at bow and stern, the latter being used for boarding by means of a scrambling net, while a sea anchor and towing bridle were attached forward. Stowed in its valise the raft measured approximately 5 feet by 2 feet by 1½ feet and weighed rather less than 200 lbs.; inflated, the length was 16 feet, the beam 10 feet, and the height 4½ feet. The capacity was 20 men (or 27 overload).

One of the first criticisms the uninformed usually level at these rafts is that they must be easily damaged and sunk. They are, however, not so susceptible to damage of the kind to which more solid affairs are liable; wooden rafts and lifeboats are often holed and sunk by being battered against the ship's side or each other in a seaway, and they injure those in the water who might be crushed between them. The inflatable raft is designed on a low-pressure system of 2 lbs. per square inch, so that should it be holed, it will not collapse like a pricked balloon; deflation is slow and there is time available to insert a leak-stopper while a patch is prepared from the temporary repair outfit provided. It is subdivided into two compartments, so that if one half is severely damaged the other will remain afloat in a "D"-shape; and as the total buoyancy provided is well over 5,000 lbs., one half will support all of the 20 occupants. During a rough-weather trial from the *Shambles Lightship*, such an accident did occur with an early prototype. The raft, fully ballasted, broke from its mooring astern due to the towing bridle snatching in the heavy seas and

tearing away from the forward buoyancy chamber (a weakness since corrected), and the raft drifted away. Fortunately it was seen coming ashore near Lulworth Cove by a coastguard, who reported that it remained floating upright in "D"-shape until it grounded and was rolled over on the beach by the breakers.

Before further Arctic trials, tests had shown that there was still a considerable heat loss through the tent and the floor of the raft. A second was accordingly built with a double tent, double sleeve-type entrances of the kind used in Polar tents, and a double floor which could be inflated manually by the hand-bellows provided after boarding. In this version the occupants in cold climates could thus surround themselves with an insulating layer of still air. So successful was this innovation during the subsequent Arctic trials conducted by a Cambridge scientist of the Department of Experimental Medicine, that within an hour of the raft being fully manned and all entrances closed, a temperature of 84° F. was generated by body heat alone. The air and sea temperatures were both 35.6° F. Of course it would be dangerous to close both entrances completely for any length of time; as the test showed, a high concentration of CO<sub>2</sub> was reached. But even when the entrances were adjusted to give enough fresh air the temperature changed little, and the report says: "At that time CO<sub>2</sub> concentrations in the double-tent 20-man float were at the safe level of about 0.5% and none of the occupants complained of panting, headaches, etc. Even during a later test, when only 5 men slept in the raft for 6½ hours, the inside temperature registered 48° F., the ambient reading being 23° F." Ordinary working clothes, not special Arctic kit, were worn by the "guinea pigs" for these tests.

There is of course a considerable difference between being dry and being wet in cold weather, and this was also the subject of tests. After a short swim in near-freezing water, one test showed that the subject's skin temperature returned to normal 10 minutes after boarding the raft. On another occasion, in Rosyth dockyard during winter, seven subjects swam a short distance to the raft and then sat inside in their wet clothes, ordinary working rig supplemented by a heavy woollen jersey. Only one man shivered hard for a few minutes, but all felt quite comfortable within five minutes. These tests are dwelt on in some detail because protection is so important to survival at sea. Scant official regard has hitherto been paid to it in the design of life-saving appliances, however; though it is useless having floating platforms, however robust, if they merely become an inducement to leap out of the frying pan into the fire.

In the tropics, the floor of the tent would not be inflated; thus maximum cooling effect would be obtained from the sea. The double tent has the effect of a double awning and, as the raft lies to its sea anchor with both entrances open, the greatest benefit is gained from any breezes that might blow. It was discovered during the tropical trials at Singapore, however, that the men sitting near the entrances were unprotected from the direct rays of the sun. This defect was overcome by re-designing the pneumatic arches so that they inclined slightly outwards; the sleeves were also modified so that, supported by light poles, they could be used as end awnings. Seating comfort was further increased by covering the inflated D-shaped cushion in each half with fabric to give support in the manner of a deck chair. These modifications increased the weight to about 210 lbs.

Because of their low centre of gravity, the suction effect of the flat bottom, and the four water-pockets under the floor, the rafts are extremely seaworthy. In any event, they cannot capsize completely because of the arches; it is however a design requirement that all aircraft dinghies must be capable of being righted by one man, and this can similarly be performed with the Naval life-raft if need be.

Fire or other hazards in the ship may prevent many rafts being reached for manual launching. This problem is being tackled by designing, for incorporation in the lashing, an automatic hydrostatic release to operate a few feet under water if the ship sinks. The freed raft, which is inherently buoyant in its valise, would float to the surface, and its operating cable or painter, being still attached to a strong point in the ship, would exert sufficient pull on the CO<sub>2</sub> mechanism to release the gas. The raft's inflated buoyancy is greater than the breaking strain of the painter, so it will thus break free and be ready for boarding by any survivors in the sea. The great hazards of nature and war are often sudden; this method of release, if successful (and there appears no technical reason against it), would therefore mark a tremendous advance in solving two of the major problems of shipwreck; the time and the ability to launch life-saving apparatus. But many life rafts, not stowed in directly exposed positions, could in any case be left without securing gear, to float clear of their own accord.

### SURVIVAL AT SEA

The late war in particular provided many examples of extraordinary endurance; the records also show that many died within minutes for no apparent reason. That the will to survive is the major prerequisite is agreed by all who have experience of the subject. Allied with this is knowledge, though not necessarily extensive; for ignorance breeds fear, and fears of the mind frequently prove more formidable handicaps than physical factors. Most people probably imagine that immersion in very cold water means death in a few minutes (a common story on the Russian convoy route), and it may well happen in the case of those who so believe, the power of the mind being what it is. During demonstrations of our life raft to the U.S. Navy, a test of this sort was carried out in the open during an American winter; the subject who was briefed beforehand suffered no undue after-effects after forty minutes immersion, yet the "ignorant" subject literally cried in agony at the end of three minutes and had to be hauled out.

Food is naturally another need. Parts of plankton, the food of whales, are edible by man, but many famished survivors have drifted through areas rich in this source of food in ignorance of its presence and value. It can be collected by towing a shirt sleeve drogue-fashion. Thor Heyerdahl, in his account of the Kon Tiki expedition, describes a method of obtaining thirst-quenching moisture from fish. It is true that the Pacific may be richer in this source of food than some other seas, nevertheless it was the theory of a Frenchman, Dr. Alain Bombard, that it should be possible to survive on fish alone; he accordingly tried and succeeded in living on such a diet for several weeks. Satisfied, he later set out in an inflatable raft to cross the Atlantic. Starting from Monaco, his last stretch from the Azores to the West Indies, carried by current, paddle, and a small

square sail, took over two months. That he once had recourse to a meal in a passing ship adds to, rather than detracts from, a remarkable feat. As he apparently discovered, the main difficulty is not in existing on fish but in catching them. That a surer means of doing so will be found in time is not beyond probability.

These are all problems which require tackling. To some, the solution may be found only in the far future; in the meantime it is necessary to provide the means of survival from more prosaic sources.

### THE ANCILLARY PACK

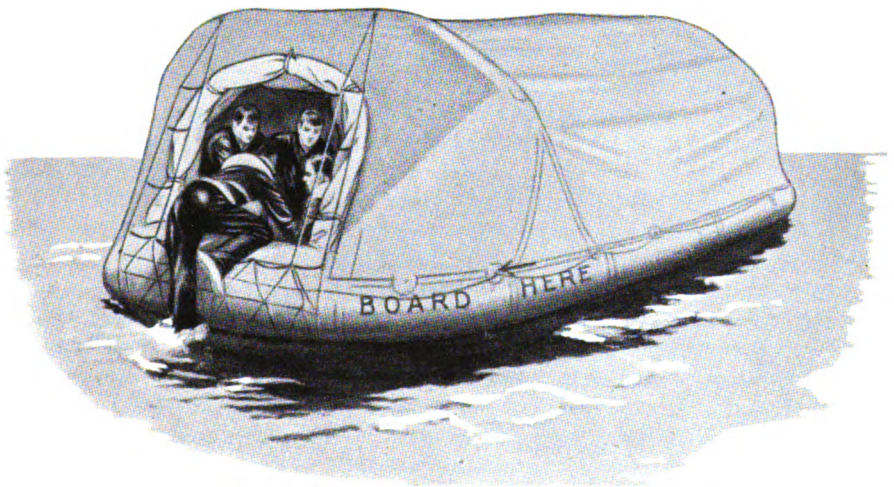
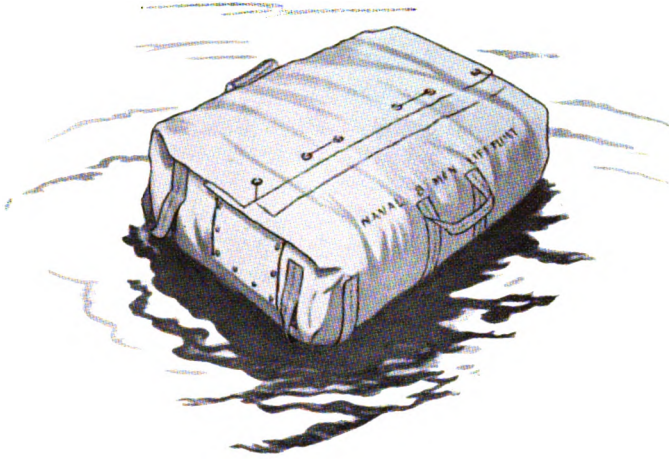
The raft provides the shelter. But food, water, and other aids are stowed in a second pack of similar shape and size which is attached to the raft's pack by straps, thus both can be thrown overboard as one unit. Development work on this project has almost been completed by the Naval Life Saving Committee and the packs should shortly go into service.

Human capacity to endure varies considerably between man and man and between the same man in different environments. It has therefore not been an easy matter to decide on a happy mean in the matter of food and water. The latter is particularly important, especially as in bulk form it accounts for the major portion of the total weight. The Committee have decided that sufficient rations for the 20 men should be provided for five days, including water in bulk for that period. This has resulted in the ancillary pack itself being heavier than the raft, the combined weight being very near the limits for convenient manhandling in adverse conditions of list and weather.

A decision to provide the maximum possible is undoubtedly right, but it has to be weighed against what is practicable, and it may justifiably be argued here that too generous an allowance is in danger of defeating its purpose. The modern lifeboat in merchant ships, for instance, is growing ever larger, which invites the carriage of equipment not really essential as well as demanding heavier and more complicated lowering gear; all of which tends in the end to reduce the chances of successful launching, as experience over the years indicates. The need to bear this constantly in mind should not therefore be lost to sight. With modern radio and radar facilities to aid air and surface search, three days' rations would seem a more practical allowance, bearing the other factors in mind.

Returning to the pack under development, it is the intention to supply food in the palatable and concentrated form of glucose sweets and toffees with high fat content. The water is contained in polythene bottles which will withstand the shock of being dropped. In addition an ingenious type of solar still, very light and occupying little space when folded, is available for distilling fresh water from the sea in favourable conditions, which are not as limiting as might be supposed, successful operation in the Antarctic summer and under overcast skies in the Channel having been achieved. And of course rain is another supplementary source, the roof of the raft being accordingly designed as a catchment. All rations are parcelled so that each man gets his own share each day.

A first-aid outfit, fishing tackle, pyrotechnics, sea markers, and other items are also in the pack. A very compact two-way radio set, weighing only three pounds, which has proved highly successful under trial, may also be adopted, one set probably being allocated to every tenth raft.



### Modern Life-Rafts

**Above.** 8-Man Raft floating, before Inflation.

**Below.** 20-Man Raft after Automatic Inflation

*(By courtesy of Elliot Equipment, Ltd.)*



## THE LIFEJACKET

Preference at sea had been given in the past to lifejackets of inherently buoyant material. Their bulk made them quite impracticable for the airman; necessity thus mothered the invention of the famous inflatable "Mae West" when cockpit space became even more cramped. War experience, however, showed that there was still much room for improvement, for airmen had been picked up at sea floating face downwards.

Considerable thought was given to the subject by many people, but major credit is due to the R.A.F. Institute of Aviation Medicine, where Squadron Leader (now Professor) E. A. Pask became his own guinea pig in the course of his investigations. Because a conscious person cannot accurately simulate unconsciousness in water, he allowed himself to be anaesthetised while in an experimental tank which permitted under- as well as above-water films to be taken for subsequent analysis. In the course of this dangerous experiment he wore many types of lifejacket currently in use by sailors as well as airmen. None of these was deemed efficient enough, while a few were actually considered dangerous although they were officially "approved" patterns. Development work on a better design then started.

Research indicated that the unconscious survivor in the water required to be maintained in a floating position on his back at an angle of about 45°. Adequate support at the back of the neck and sides of the face was essential to prevent the head falling sideways and becoming partly immersed. While a design which maintained an upright position could perhaps give better head clearance, it was found that this attitude in disturbed water resulted in vertical oscillation, causing the wearer to be ducked every now and again; and it also subjected the body to maximum effects from underwater explosions.

With this information to guide them, the N.L.S.C. attacked the problem from the seaman's angle, and in due course evolved the lifejacket which is now issued as standard equipment. It consists of a single inflatable chamber which, by means of the large "bubble" of air on the chest, provides a strong turning moment to keep the wearer on his back, while the part encircling the neck gives close and adequate support to the head. The bottom of the chest chamber is anchored closely to a webbing belt, thereby lifting the waistline to the correct 45° position. A simple rescue harness of the same material as, and attached to, the belt terminates on top of the chest chamber in a prominent loop; by this means the survivor, whether covered in oil or not, can be readily hoisted out of the water in the position least likely to incur injury from any obstructions on the rescue vessel, or aggravate any existing injuries. Inflation is by mouth through a spring-loaded non-return valve, although the design is such that a CO<sub>2</sub> cylinder and operating device for semi-automatic inflation can be fitted where speed may be essential. A light and whistle are standard accessories. The jacket is donned halter-fashion and, when not in use, is rolled and stowed in a pouch on the belt; worn in this manner it offers least hindrance in work about the ship. Jumps with a fully inflated jacket have been made from as high as 32 feet with perfect safety, the collar showing no tendency to ride over the head.



## INTERNATIONAL REGULATIONS

This equipment is not regarded with favour by all the authorities concerned. In 1948 the International Conference on Safety of Life at Sea, attended by over thirty nations, renewed the ban on all forms of inflatable apparatus. Other principles on which the Ministry of Transport rules for Merchant ships are based appear to conflict with the findings of recent research.

Although the regulations require boats to have "rigid sides", and thus ban a flexible raft as an alternative, open boats do not supply the full protection needed for survival in adverse conditions. Neither are they more seaworthy—probably less. They have (again, as required by law) means of propulsion by oars, sail, or mechanical power which the life raft lacks, but it is at least debatable whether this is an advantage. The compulsory provision of radio in ships and modern facilities for air search have altered the picture. The daily position is usually known, the point at which searches will start if an emergency arises. The closer survivors remain to that position the quicker they should be rescued.

Again, life rafts can be launched much more easily and swiftly—may indeed launch themselves if necessary. It is true they cannot be lowered into the water fully manned, but, once more, is this as serious an objection as appears at first sight? In a high degree of emergency, the queueing up necessary to man the conventional lifeboat imposes delays that must in part add to the final casualty list. The rafts could be manned by ship-side ladders (already required by law) and from the sea by those who jump in—with confidence in their inflatable lifejackets and no fear of landing on solid boats below! The considerable saving in topweight and space must appeal to naval architects and owners alike, apart from monetary reasons. A power or pulling boat will of course always be needed at sea and in port for obvious reasons, but no more than one or two should be necessary.

In the case of lifejackets, the regulations state that "No lifejacket shall be approved or carried the buoyancy of which depends on air compartments." Why this categorical disapproval of air as a means of inflation is not clear, unless inherent buoyancy is deemed vital to cover the cases of elderly or very young passengers who might not be able to blow up inflatable apparatus. But that is not a valid argument, for such people would in any case need help. Or perhaps the authorities have in mind the unreliability of early types of pneumatic equipment? To-day, improved methods in the manufacture of both the fabric and the adhesive agent greatly reduce these risks. The superiority that air or gas has over kapok or cork is thus lost because of the present restrictions.

Furthermore, the regulations state that the buoyancy should be so distributed that the wearer must, if inert, be supported in a position "as near the vertical as possible." This has been shown to conflict with modern scientific opinion. An officially "approved" lifejacket must also be "reversible" and capable of being donned inside out. As the recent exhaustive tests have shown, a jacket so flexible in use cannot possibly fulfill the function of floating the inert wearer in the safest attitude. The new lifejacket may be more expensive but, as a measure of compensation, it is lighter and far less bulky, and therefore requires less stowage space.

The detailed nature of the International regulations on this important subject do however indicate the high standard aimed at. Moreover, the need for improvements is borne in mind, and the Ministry of Transport is accordingly carrying out trials with the naval life raft with a view to approving it for use in all ships under their jurisdiction.

### THE TOLL OF SHIPWRECK

Not all ships founder in heavy weather or in wintry conditions, but the design of life-saving appliances must attempt to cater for the worst circumstances. Do progressive improvements to current equipment in the Merchant Service show signs of reaching that standard? The loss of the "Titanic" is of course a classic example. In April, 1912, she struck an iceberg and 1,480 lives (68 per cent) were lost. The "Lusitania", torpedoed three years later, sank in 20 minutes with a loss of 1,198 lives (61 per cent). In 1922 the "Egypt", as the result of a collision, sank in the same time with a loss of 887 lives (78 per cent).

An example more vivid in the public mind is that of the "Princess Victoria", the Stranraer-Larne ferry steamer, which foundered off the Copeland Islands last January, with a loss of 128 lives (73 per cent). The writer listened during the first week of the Ministry of Transport inquiry into this tragic disaster to the evidence of 17 witnesses and had the opportunity later of speaking with some of them. If further argument were needed to support the contention that the conventional lifeboats and wooden rafts are ill-designed to meet life-saving requirements in heavy seas, then this case does so with great emphasis. No official report is yet available, but according to press reports Captain Kerr, a Master of many years experience who was taking passage, said, "It was an impossibility to launch lifeboats successfully and more than that, it was impossible to get into the lifeboats because of the ship's list". The report then goes on, "The boat that he got into while it was on the water turned a complete somersault on the way down." Another witness said he saw two young men, who jumped towards a lifeboat in the sea, "get smashed against the side of the steamer". The same witness was the only one of four on a raft who managed to cling on until rescued. Mr. Brewster, skipper of the Fleetwood trawler which made valiant attempts at rescue in the heavy seas, when asked about the life-jackets survivors wore, gave his opinion as: "I am sure if anybody jumped from any distance at all into the water, these things would come up and choke them straight away. The survivor we picked up was semi-conscious when we got him aboard. Before we got him he was pulling his lifebelt down from his neck. He must have known that if he had let the lifebelt go he would have been choked" (a reference to the only one of seven picked up by this trawler alive, or the only one to survive). Experiences like these are multiplied manyfold in smaller vessels year after year.

### MAINTENANCE

It is obvious that efficient equipment cannot remain efficient without attention. The past attitude towards life-saving gear has rather been to let it look after itself—with the results already described. Inflatable equipment requires maintenance, but not out of proportion to its potential

value. It should be given a daily check at sea, just as any other important piece of equipment that might be required at short notice should be examined for serviceability; but no special skill is required. It needs, again like other important equipment, a comprehensive test and detailed inspection at intervals; experience to date is that this can safely be done every six months, although the indications are that an annual overhaul may suffice. The latter work, however, requires to be done by trained personnel, and it is the provision of these men to which objection tends to be made.

The Navy has trained such men. In the Merchant Service, however, the answer is not so easy because of the small numbers available for specialist work. Yet the introduction of similar innovations always brings in its wake the same problem; radio and radar are but two examples, and they require both operators and maintenance personnel possessing far higher degrees of skill and training. Nevertheless, with inflatable equipment economy of labour could be achieved in a way not possible with the other two; that is, centralised maintenance at ports where space and facilities for carrying out the work can be more readily made available.

Finally, neither the Admiralty nor the manufacturers lay claim to this apparatus being regarded as the last word; but it is considered an advance on anything hitherto produced—the best until ingenuity makes better available.

G. W. R. NICHOLL

## CHAPTER XVIII

### THE FLEET TRAIN

A GLANCE at the old "Lists of the Navy" of the 17th, 18th, and early 19th centuries show many hundreds of small ships under the general classification of "victuallers". They plied backwards and forwards between the ships of the fleet, wherever they might be stationed, and the dockyards at home or oversea, carrying replenishments of water and beer, biscuits and beef, sailcloth, shot and powder. The warships of those days required little maintenance on the whole, apart from the supplies of food, water, and beer which the victuallers brought. Any stretch of hard sand was enough for them to careen and clean their bottoms. Water, when the victuallers could not supply it, was often obtainable from rivers and streams along the coasts; local purchases ashore of beef cattle and hogs, and often of wine, would relieve the tedium and tastelessness of "salt horse" or the sourness of the beer. Spare yards were carried on board, and these could be rigged as temporary masts when the main spars went by the board in storm or battle. When a fleet operated in distant waters, such as that of Pocock in the East Indies in 1758, it made its own arrangements for supplies of victuals and, such was the simplicity of ship administration in those days, maintained itself in fighting trim from its own resources.

The change over from sail to steam, from wood to iron, brought in its train far more than a mere change in the outward aspect of the Royal Navy. Ships could no longer use the wind to move them from place to place, the all-important requirement was coal for the boilers and oil for the engines. A rapidly rising standard of living called for a far greater variety of victuals, and new amenities for the ships' complements, such as regular pay, the receipt and despatch of mail, and the provision of what were known as "comforts" for ships on distant stations, called for a far wider administrative outlook than had been needed in the days of sail. The larger crews required more food, the increased rate of fire of the guns required more ammunition, the growing technical equipment required more stores, but the need to provide space for fuel bunkers cut down the space available for provision holds, magazines, and store-rooms.

Thus the interval between storing periods was cut shorter and shorter as the fighting efficiency of the ships and welfare of their crews progressively improved. Moreover, whereas copper-sheathed bottoms required but infrequent cleaning, steel hulls fouled rapidly and required regular scraping and painting and for this purpose dry docks were necessary as the size and nature of the ships no longer allowed careening. Ships therefore became ever more dependent upon frequent return to bases and so was curtailed sea power's greatest asset—mobility and flexibility.

The solution to the problem of maintaining mobility was found in the fact that Great Britain was already a colonial power and that in her empire there existed potential bases in almost every corner of the globe. New dockyards were planned and established, a wide series of coaling stations

were set up in strategic points so that the fleets of Britain could still operate. But it was never a complete solution, for dependence on a base limited a fleet's range of effective action, especially in the matter of fuel. It was, however, a problem that rarely called for a complete solution, for British sea power was sufficiently strong during those days to maintain peace throughout the world.

The growing naval strength of the United States, especially during the early years of the present century, presented to that country the same problem but without the same means of solution. Mahan earlier in 1889 had thought of the matter for in his book "Influence of Sea Power upon History" he states "The necessity of renewing coal makes the cruiser of the present day even more dependent than of old upon his port." Later in the same book when relating of a passage by Bickerton from England to India in 1878 he states "A voyage of such duration could rarely be made without a stop for water, for fresh provisions, often for such refitting as called for the quiet of a harbor, even when the stores onboard furnished the necessary material. A perfect line of communications required several such harbors, properly spaced, adequately defended, and with abundant supplies, such as England in the present day holds on some of her main commercial routes, acquisitions of her past wars." America had never been a colonial power and had no territorial possessions capable of development into naval bases. Yet her fleets needed to operate, especially in the Pacific, at distances beyond the range of maintenance from a metropolitan base; so, looking back to the days of sail, they were forced to rely on the services of the "victualler", and built up a system by which a fleet on service in distant waters could be nourished and supplied by auxiliaries carrying all their day-to-day needs. Looking back, too, to the days of military expeditions with their prodigious baggage trains, they borrowed from history the ancient nomenclature and re-christened their "victuallers" the Fleet Train.

The Russians encountered the same problem when they decided to sail their Second Fleet from the Baltic to the Far East during the Russian-Japanese War. This they solved not very satisfactorily by sailing in company with them an "armada" of victualling, repair, and hospital ships. Coaling was planned to be carried out mainly by chartered German colliers in neutral harbours, but this proved chancy as it depended on the political whims of the neutral power. Coaling at sea was tried but its difficulties and hazards are well described in the following extract taken from "Rasplata"—an account of the passage written by Vladimir Semenoff.

Coaling from a steamer alongside did not succeed once. On the high seas there is always, even in a perfect calm, a certain amount of swell from somewhere—perhaps hundreds or thousands of miles off. Coaling was carried out by transporting the coal from the collier transports in sacks, stowed in the ships' launches or specially constructed lighters, towed by steam-boats. For the purpose of filling the sacks and hoisting them into the boats, considerable working parties (one hundred men and more from each big ship), with officers, were sent to the transports; a goodly number of men were also employed in the lighters, launches, and steam-boats. Of course it was not possible to maintain any formation during this operation, as the transports and men-of-war were all mixed up so as to ensure rapid coaling. Moreover, the guns were all run in and secured, and covered up carefully,

so as to keep the coal-dust out of the delicate parts of their complicated mechanisms and mountings. In a word—the squadron was not only not prepared for action, but could not even be rapidly prepared for it in case of a sudden alarm.

The subsequent defeat of the Second Fleet at Tsushima was largely due to the lack of adequate logistic support on the passage East.

The early 1920's saw yet one more metamorphosis in naval supply. Coal, which had been fighting a losing battle for some years against oil, was finally defeated and retired from the field. With it went the coaling stations, so painfully set up all over the world. At the same time new weapons and new techniques made their appearance, bringing in their train a far more comprehensive list of supplies without which a modern fleet was unable to operate. The problem began to rear its new head with an added urgency, for the needs of a 20th century fleet grew almost daily in the quickening speed of technical development. The only unchanging factor was distance, and it was still as many sea miles from the Magellan Straits to Manila as when Drake sailed them in 1578, or Anson in 1741. And it was distance that posed the ultimate question, how to keep a modern fleet at sea, and ready for action, for periods long enough to be of real value in modern naval warfare.

Up to and during the early part of World War II, the operations of the Royal Navy were planned almost wholly upon the principle that ships fully equipped and stored would sally forth from established bases and return thence or to another established base either on completion of the operation or when their endurance was running out. In a war confined primarily to the European continent and its near waters, the time-distance factor at sea is comparatively so small that the restriction to operations caused by dependence upon support solely from established bases is not of much consequence. Even so, there were during World War II occasions when the existence of an experienced and well equipped underway replenishment group could—to say the very least—have relieved much anxiety. Such occasions were, for instance, the chase of the "Bismarck" and the many operations providing cover by large ships to Russian convoys.

As the war spread further afield and the time-distance factor increased, it became only too apparent that unless some form of mobile logistic support could be provided, strategy and operations would be dictated solely by the location of established bases. The loss of Hong Kong and Singapore threw the East Indies Fleet on to the defensive. In May 1942 this fleet consisted of five battleships, three Fleet Carriers, seven Cruisers, sixteen destroyers and three submarines. The only bases near its area of operations were Trincomalee and Colombo which were too vulnerable and lacked adequate facilities. Addu Atoll in the Maldives was in the course of development as a Fleet anchorage and lacked many essential base facilities. By the end of 1942, because of the lack of adequate logistic support we were compelled to abandon the attempt to keep a Fleet in being from undeveloped bases in Ceylon and Addu Atoll and instead base the bulk of it on Kilindini over 2,500 miles from the operational area to the eastward of Ceylon. It became quite clear then that if we hoped to go over to the offensive and expand our operations to the Eastward and into the Pacific, we must extend the mobility of the fleet by providing advanced bases as near as possible to the area of operations.

The increase of sea-air power also made it clear that to maintain command of the sea, the Fleet must remain as an effective force continuously within the area of operations. Therefore if full use was to be made of mobility, supplies must be brought to the Fleet and not vice versa. This meant extending the pipe-line of supply from advanced bases to the Fleet operating at sea by means of seagoing logistic support groups.

Even before the war, the Admiralty had given some thought to the problem of maintaining supplies for the Fleet should certain established bases not be available. A Supply Ships Committee had been appointed in 1936 and recommended that for naval and victualling stores cargo ships of about 5,000 tons should be taken up from trade and converted to serve as combined issuing ships for both types of stores. For armament stores they recommended that cargo ships of some 6,000 tons should be adapted as armament store carriers and ships of 2-3,000 tons as armament issuing ships. Amongst their conclusions, they estimated that in the event of a war in the Far East over 60 ships—the majority being armament store ships—would be required. As it would take time to adapt ships for the purpose, they recommended that some should be taken up and converted before the outbreak of war. When war did break out in 1939 the Committee re-examined the requirements and decided that some 50 ships would be wanted for the areas then affected. Within the next two months many merchant ships were taken up and converted in accordance with the Committee's recommendations.

By the terms of reference, the Committee's investigations were limited to matters of supply and the important aspects of maintenance and repair were omitted. At the outbreak of war, the Navy fortunately already had in service some depot ships for destroyers and submarines and also one repair ship. The latter—the *Resource*—had been built in 1930 for the specific purpose of providing repair facilities for ships in the floating dock at Singapore should war have broken out before the dockyard on shore was completed. During the early months of the war, it was appreciated in the Admiralty that the repair facilities available in the Indian Ocean and Far East were very meagre and the loss of Singapore later made the situation acute. It was clear that the existing facilities could only be augmented by the provision of repair ships and in April 1942 it was approved to take in hand for conversion to repair ships, some liners which had been serving as armed merchant cruisers.

There was therefore a nucleus of store ships, and a few depot ships and repair ships in service when in the summer of 1943 the Admiralty made the decision to form a Fleet Train for the East Indies and a further one for the Pacific. These Fleet Trains were required to form Mobile Fleet Base Organisations whose primary function was the rapid provision of facilities necessary for sustained operations of the Fleet in an area removed from established bases.

The situation in the two areas was not identical, as the East Indies Fleet was mainly engaged in operations off an enemy occupied land-mass in which established ports and harbours already existed whilst the Pacific Fleet, when formed, would be required to operate in an ocean which was studded at infrequent distances by enemy-occupied but mostly undeveloped islands. Moreover the support areas of India and Africa were nearer at hand to the East Indies operational area than that of Australia

to the Pacific operations. Nevertheless although the task of supporting the Pacific Fleet would necessarily be the more difficult, the basic factors remained the same for the two theatres and could be divided into two :

- (i) The provision of mobile base facilities for repair, maintenance, and administrative purposes capable of being moved from one captured port or anchorage to another as the operational area moved forward.
- (ii) The replenishment of provisions, stores, and ammunition either at sea or at an anchorage.

Having been given the forces to be supported, the Naval Staff were set the problem of estimating the composition of the Fleet Trains in a phased programme to meet the dates by which the support was to be effective.

From the earlier stages of the Japanese War, the United States Navy had been forced to carry out operations in waters where no bases existed and their experience had shown the necessity for providing base resources on a fully mobile scale as the construction of installations ashore was time-consuming and tended to bog down logistic support whereas the operational situation required it to be fluid and flexible. The Admiralty, therefore, decided that all support wherever possible should be afloat. As was inevitable, the estimated requirements amounted to a vast number of ships. The only possible means by which these could be provided in the time available was to withdraw merchant ships from, and take over ships already building for the hard pressed and vital shipping services carrying raw material for, war production, supplies for civilian populations, and delivering war equipment for other forces fighting overseas.

The stated Admiralty requirements therefore came into conflict with the Ministry of War Transport and the War Office, and affected our agreements with the U.S.A. As a consequence they were tabled at the first Quebec Conference August 1943, and because of their own experience, received full support from the Americans. The difference, however, with the Ministry of War Transport and War Office persisted and it was only the determination of the Admiralty which eventually enabled the Fleet Train for the East Indies to be built up and that for the British Pacific Fleet to be assembled in time to support the operations envisaged.

### COMPOSITION OF THE FLEET TRAIN

The staff requirement for the composition of the Fleet Train was revised in September 1943. In order to support a balanced fleet the need was stated to be Fleet Auxiliaries for the following purposes :

- (a) Repair ships for Fleet repair purposes with associated accommodation ships for the necessary repair personnel.
- (b) Depot ships for the maintenance of destroyers and submarines.
- (c) Maintenance ships for smaller naval craft such as escort vessels, minesweepers, and M.T.B./M.G.B's.
- (d) Maintenance ships for technical equipment, guns, torpedoes, radar, etc.
- (e) Accommodation ships for housing senior officers, their staffs and other personnel, and as reception barracks for incoming drafts.



- (f) Maintenance ships for small naval craft which would be required in large numbers for inter-communication between Fleet Train Units and the operational units.
- (g) Maintenance ships for Fleet Air Arm aircraft.
- (h) Boom vessels and Boom Carriers and seaward defence vessels.
- (i) Water distilling ships.
- (j) Hospital ships.
- (k) Naval store issuing ships.
- (l) Armament stores issuing ships.
- (m) Victualling store issuing ships.
- (n) Naval, air, and victualling store carriers.
- (o) Tankers in large numbers.
- (p) Tugs, lighters, and harbour craft.

Consideration was then given by the Admiralty and Ministry of War Transport to the immense measures required to convert the necessary ships. As many conversions as possible were undertaken in the United Kingdom, to enable which cuts were made in the Naval shipbuilding Programme and Merchant Ship repairs were deferred. Some ships were converted in Canada, and the United States provided certain types which were already under construction in that country. It would take too long to relate the many factors involved in obtaining and converting the necessary ships to compose the Fleet Trains. The whole of 1944 was spent in a struggle to build up the one to support the Fleet in being in the East Indies and one which could adequately support the British Pacific Fleet for the operations envisaged in the Pacific timed to begin in early 1945.

Agreement was reached at the Quebec Conference in September 1944 that the British Fleet would participate in the main operations against Japan only on the understanding that the Fleet would be balanced and self-supporting. It was therefore very essential that the Fleet Train should be fully in operation by the planned dates. The nature of the operations called for the formation of a balanced Task Force operating right forward off the coasts of Japan and Formosa. By December 1944 it was becoming clear that the provision of logistic support and not the number of warships would become the limiting factor to our operations in the Pacific.

Australia was the nearest support area and it was therefore necessary to institute advanced bases closer to the planned area of operations. These advanced bases were Manus in the Admiralty Islands, Leyte in the Philippines, and Ulithi in the Carolines. At these places the Fleet Train provided afloat practically all the necessary facilities. The one vital necessity that could not be provided afloat, was an air-strip for the reception of spare aircraft and for operating aircraft for defence of the base.

A typical programme of the operations of a Task Force was to sail from Australia fully stored for an advanced base where it refuelled before continuing its passage to the operational area. On reaching the operational area it refuelled at sea and then carried out a routine consisting of two days strikes alternating with withdrawals to a replenishment area at sea to refuel and embark stores and ammunition underway from a mobile logistic support group. This routine continued for at least three or four

weeks and the Task Force then returned to an advanced base for a few days for a more thorough replenishment. It proceeded again to the operating area and repeated the operational routine of strikes and under-way replenishment for a further three to four weeks and finally the Task Force returned to Australia for complete re-storing.

The Fleet Train was under the Command of a Rear Admiral who had a large staff of operational and technical officers to assist him in his complicated task. The staff work required for co-ordinating requirements and producing a replenishment programme on arrival of a Task Force at an advanced base must have been a major undertaking. Small craft and boats for delivering stores and personnel were always in short supply. L.C.Ms and DUKWs proved invaluable. Everything had to be completed at a rush to enable the Task Force to get to sea again as soon as practicable.

Apart from the Fleet Train ships at the advanced bases the Rear Admiral, Fleet Train, had under him the Commander, Logistic Support Group, who was responsible for replenishment at sea activities. The seagoing Logistic Support Group usually consisted of three or four tankers, a victualling stores issuing ship, and an armament stores issuing ship, and this Group was escorted by frigates, sloops, and destroyers and supported by Escort Carriers. The difficulties of replenishing at sea experienced by the Russians related earlier in this article were overcome by the introduction of new methods of transferring fuel, equipment, and stores between ships whilst underway. Oil fuel, fortunately easier to manage than coal, was transferred either by the abeam or the astern method and solids in the shape of stores and ammunition either cased, in trays, or provision nets, were transferred by the "burtoning rig" evolved by the Americans and the British jackstay method. Personnel could also be transferred by the later method by using chairs or breeches buoy. One of the Escort Carriers accompanying the Logistic Support Group normally carried spare aircraft for making good losses in the Task Group. In addition the Escort Carriers provided fighter protection and target-towing so that all ships could carry out practices during the replenishment period.

Late in 1944 it had already been decided at Anglo-American conferences that no more ships could be spared for the Fleet Train, but early in 1945 it was obvious that the size of the Fleet Train, large as it was, was barely sufficient to support the strength of the existing Fleet and far less would it have been able to support the planned increased strength at the end of 1945. It would thus have become necessary to reduce the strength of the Pacific Fleet or restrict its scope of operations unless either additional ships could be provided for the Fleet Train, or the Fleet Train could be supplemented by loads carried in freight ships. As it was, improvisation on the lines of the last alternative had to be resorted to before the war came to its end.

#### GENERAL CONSIDERATIONS

All the strength of sea power springs from the land. Ships are built on land and all their support comes from the land. No matter how much we may extend their endurance, ultimately ships and men must return to land to restore their fighting ability, the sharp edge of which can only be

whetted at sea but which becomes blunted by continuous service at sea. The base is the focal point through which is channelled all the activities of the land—the support area—necessary to build up and maintain sea power. These activities consist of shipbuilding and aircraft construction; production and supply of equipment, stores, and ammunition; recruitment and training of man-power; repair and maintenance of ships and aircraft and their equipment; rest, recreation, and rehabilitation of crews.

The qualities required of a main naval base are that it should be established near to a likely operational area yet so placed that it offers reasonable security from intensive attack; it must offer good facilities for the berthing, docking, repair, and maintenance of ships. It should be located in civilised surroundings so as to provide means for the rest, relaxation, and recuperation of ships' companies. It must have ready access to airfields for operating aircraft. By the extent and nature of its many functions the main base must be permanently established and is thus costly to create and maintain and, what is more important, it restricts operational mobility of the Fleet.

To restore the mobility and flexibility of the fleet, and to enable the Fleet to continue operation in the operational area without being delayed by a return to the main naval base or support area, it is necessary to establish advanced bases. In peace time, it would be quite impracticable to construct a network of such bases to provide for every contingency and so the majority of these have to be planned to be put into being when war breaks out. Invariably, facilities at existing ports, harbours, or anchorages earmarked to be used as advanced bases in wartime are either non-existent or are such that there is a large gap to be filled between requirements and availability. This gap can be filled only either by shore construction or by providing mobile base facilities. Shore construction takes time and creates a stabilised situation when what might be required is a flexible and fluid flow of support in a moving operational situation. Therefore, there is a need to plan for certain mobile base facilities which can, if necessary, be moved to where they are most required. It is to these mobile base facilities to which we apply the term "Fleet Train".

The necessary units comprising a "Fleet Train" are all specialised types of vessels which themselves require time to build or convert and therefore to be of value when most required they should already be in existence in peace time. Far from easing the problem of logistics, the operation of the "Fleet Train" imposes an extra burden on the logistics system in that it has to deal also with the needs of the mobile support units in addition to those of the operational units. It imposes difficult problems of maintenance and organisation in keeping full the pipeline of supplies to the operational area. Therefore the decision to provide a "Fleet Train" is not one which should be undertaken lightly, especially in view of the uneconomical aspect of holding in peace time Floating Base Support units of which full operational use cannot be made and also in view of the fact that, in war time, merchant ships taken up for the purpose may be a waste of valuable and often specialised tonnage.

The two functions of the Fleet Train, namely:

- (i) replenishment at sea,
- (ii) floating base support,

call for two different classes of ship. The former requires oilers, victualling, naval, air, and armament store issuing ships or a combination of these vessels. An essential requirement is a speed of at least 15 knots, good seagoing qualities, and special equipment for transferring liquids and solids whilst under way in company with the ship to be replenished. On the other hand, ships forming the floating base support element need only be sufficiently mobile to enable them to proceed in slow convoy. According to the nature of the advanced base the types required are repair and maintenance ships, depot-ships, headquarter and accommodation ships, oilers, victualling, naval, air, and armament store issuing ships, amenity ships, harbour craft, floating docks, tugs, hospital ships. Freighters which are employed in conveying bulk supplies from the main support area to the advanced base are not included in the Fleet Train.

The Royal Navy possesses today either active or in reserve Fleet Train ships to the order of some 40 oilers, 9 Victualling, Naval, or Armament Store Issuing Ships or Carriers, 5 Destroyer and Submarine Depot ships, 3 Repair Ships, 1 Hospital Ship, tugs, and small craft. Much consideration and thought has been paid to developing the equipment of the Fleet Train particularly in replenishment at sea, extensive trials of which were carried out in H.M.S. Bulawayo an ex-German naval tanker. As a result of experience in these trials, three fast tankers have been laid down which are to be specially equipped for replenishing Task Groups at sea with furnace oil and aviation fuels. Two merchant ships have also been acquired which it is intended to convert and specially equip to transfer solids at sea, particularly ammunition but with a certain amount also of naval, air, and victualling stores.

The war in the Pacific emphasised that the degree of logistic support provided directly controlled the strength and diversity of operations. The nature of the sea battle, whether offensive or defensive, has a direct bearing on the nature and degree of logistic support required. The type of Fleet Units involved also affects the nature and degree of logistic support necessary. Today the trend in the Fleet is towards an ever-increasing proportion of small ships, which because they are necessarily less self-reliant in maintenance, require a greater need for base support, and because of their small endurance entail a greater number of advanced bases to preserve flexibility.

The desirability of providing floating facilities for advanced bases in preference to constructing installations ashore is becoming more weighted in the light of the probable nature of a future war particularly with its increased air threat and atomic threat. Dispersal and distance provide the best protection against intensive attack and this can be assured if the majority of facilities are afloat. Moreover, the existence of a Fleet Train capable of providing sufficient logistic support to create an advanced base is an insurance should an existing established base be rendered inoperative through enemy action.

“NED”

## CHAPTER XIX

### THE CAMPAIGN IN KOREA

BY MAJOR R. C. W. THOMAS

NOTE—*Until a few months ago the author of this article was on the Staff of the Commonwealth Division in Korea. The article has been revised up to the end of April, 1953.*

#### PART I

#### GENERAL

WITH THE approach of the third anniversary of the start of the War in Korea, once again this struggle has become front page news, not because of military events but because at last there are indications that the War may soon be over.

At the same time, during this present period of cautious optimism for the future, it must not be forgotten that during the last twelve months a cruel and bitter war has been going on all the time in this far distant land.

In this article, the author has attempted to describe some of the events and kind of fighting that have taken place in Korea during the last twelve months.

There is nothing very spectacular to relate in this story because the war that has gone on has not been of a spectacular nature as few wars ever are. It has just been a long weary "slogging match", with little to gain but everything to lose.

#### *British Commonwealth Division*

During the last twelve months, the British Commonwealth Division has continued to take an active part in the fighting that has gone on in Korea, and to-day there is no shadow of doubt that the experiment of forming a Commonwealth Division has proved to be an outstanding success.

On the 28th July, 1952, the Division celebrated the first anniversary of its formation, and later at the end of the year when it was possible at last to allow the Division a two month rest period, it could look back with pride on nearly eighteen successive months in the front line, a record that probably has never been equalled before by any other division in a modern war.

Throughout the last year, the Division has held a sector on the Western Front, almost due North of Seoul, and astride one of the two main routes that have been used throughout history for the invasion of South Korea. In the Divisional sector the nature of the ground is wild and rugged, and calls for skill in fighting a combination of jungle and mountain war, not unlike the kind of fighting done by the Chindits in Upper Burma during the Second World War.

Although, like everywhere else in Korea during the last year, the Divisional front has been completely static, nevertheless many bitter battles have been fought with the enemy, particularly during October and

November, 1952, when a Canadian and British battalion, in turn, each defeated a strong Communist attack launched with the aim of capturing vital hill feature positions. And so, although the fighting done by the Division may not have been of a spectacular nature, however perhaps its extent can be best illustrated by the fact that up to the end of 1952, the Division had won nearly five hundred decorations for gallantry in the field, including one Victoria Cross.

Of course the most unique feature of the Commonwealth Division has continued to be its composition, in that the Division now comprises units and men from six different nations, namely Great Britain, Canada, Australia, New Zealand, South Africa, and India. But instead of proving a handicap, there has grown up a degree of understanding, respect, and friendship between the various national contingents, which probably has never existed before to such an extent. Much of the credit for this situation is of course due to the inspiring leadership and example of Major-General, now Sir A. J. H. Cassels, first Divisional Commander, which has been fully maintained by Major-General M. M. A. R. West who succeeded to the Command of the Division in September, 1952. There is no doubt that the Commonwealth and India have been well served by these two officers.

At the same time, it would be foolish to try and pretend that the Division is always one big happy "family", without ever having any real problems to face. Actually innumerable difficulties are always arising, especially in respect of supply and maintenance, through the Division being made up of so many different National contingents. Overheads and duplication all too easily tend to develop. Not all arms and equipment are standard. Different rations are eaten by different units. Individual national interests and traditions have to be safeguarded, and often a change of policy can not be effected without first obtaining the agreement of several different governments. Finally the whole position is further complicated by the fact that for operations, the Division is entirely under United Nations Command, and serves within an American Corps on exactly the same footing as other American Divisions in the Corps.

Often the "path of righteousness" has been very slippery, but in the end, the right answer is invariably found, simply because of the spirit of co-operation and friendship that burns so brightly in Korea between every man of the United Nations Command, irrespective of his nationality. There is little doubt that his spirit has been a most decisive influence in Korea, and without it, it is doubtful if the United Nations Forces could ever have achieved what they have done.

Other than the fighting, there have been three major events during the last year of interest to the Division.

In May, 1952, two companies were called for to assist in guarding Communist prisoners of Koje Do Island, after their rebellion. These companies moved to the island at very short notice, and during their two months tour of duty, they carried out this unpleasant task with very great distinction.

At the end of June, 1952, the Division was honoured by a visit from Field Marshal Lord Alexander, Minister of Defence, accompanied by Mr. Selwyn Lloyd, Minister of State. The visit of these two distinguished members of the British Government was of tremendous morale value, and

it did much to remove the feeling that the War in Korea had become forgotten by the outside world. Of course, later the Division was also privileged to receive a visit from President Eisenhower.

Finally, recently the Division has embarked on yet another unique experiment, by accepting a thousand South Korean soldiers to serve as organic troops of the Division. These men are known as Katcoms, meaning Korean Augmentation Troops, Commonwealth Division, and they are being paid by their own Government, but fed and equipped by the Division. Many of these South Korean soldiers are potential officer and N.C.O. material, and they have been organised into a number of small units such as platoon and companies, attached to large Commonwealth sub-units. The arrival of these men has greatly increased the strength of the Division, while at the same time it will be an invaluable experience for the South Korean soldiers themselves.

There is perhaps one last remarkable feature of the Division that has become most apparent in the last year, namely the youthfulness of its fighting soldiers. By far the largest part of all contingents are young men of 19 and 20 years of age, and in the case of the British units 70% are National Servicemen. But despite their age, the extent of their morale, enthusiasm, cheerfulness, and above all bravery, is in keeping with the highest traditions of the armies to which they belong.

### *Peace Talks*

During the last year and up to March, 1952, the so-called Cease Fire Talks have continued to be held at Panmunjom, a deserted village which lies on the western side of the Korean peninsula, just south of the 38th Parallel.

Since the meetings started in July, 1951, nearly one thousand hours have been spent by the delegates of the two sides trying to achieve an agreement, that would make it possible for a cease fire to take place in Korea.

By the end of April, 1952, the conference had succeeded in achieving a draft armistice agreement over four major points covering roughly:

- (a) The methods of enforcing a cease fire.
- (b) Establishment of a Neutral Zone between the two armies.
- (c) Cessation of shipments of additional troops and war materials to Korea.
- (d) Establishment of a Neutral International Commission to supervise and enforce the cease fire agreement.

But from April, 1952, until recently, a complete deadlock existed at the talks over the final article requiring agreement on the repatriation of prisoners of war. As is well known, the crux of the disagreement has been the Allied insistence on the principle that no prisoner should be repatriated against his will, and the fact that screening has shown that only 83,000 Communist prisoners were willing to be repatriated, whereas the enemy insisted on the return of 116,000.

And so during the last year, meetings have continued at irregular intervals, whenever it was hoped the Communists might have something useful to say to end the deadlock.





(Associated Press Photograph)  
Korea—1953. "Freedom Village" near Munsan. The camp erected for the reception of British Commonwealth, American and other United Nations exchanged prisoners of war





A visit to Panmunjom is of course an interesting experience, simply because of the "Mad Hatter's Tea-Party" atmosphere that exists there. The conference area is only one thousand yards in radius, surrounded on three sides by Communist battle positions, and on the fourth by those of the United Nations. These positions are outside the neutral zone, and are often subject to attack, even while talks are actually in progress.

Within the neutral zone itself both United Nations and Communist soldiers together patrol the roads that lead to the neutral zone area, which is marked by red panels and four Americans balloons by day, and by American searchlights by night.

The two delegations consist of five members each, and they meet in a small marquee tent which is divided into two halves by a table down the centre. Each side is responsible for furnishing their own half, and neither side ever cross into the opposite side of the tent.

More often than not, the atmosphere at the meetings has been extremely unfriendly. There is no neutral chairman, and neither side attempts to be formally polite. Usually the United Nations delegation appears to maintain a casual air, while often the Communists are deliberately rude and hostile, to such an extent that the United Nations Officers often walk out of a meeting when the Communists start to deliver some harangue, obviously made for no other reason but political propaganda.

All meetings are attended by varying numbers of press representatives of both sides, but they are not allowed to enter the tent while meetings are in progress. For their story, United Nations' newspapermen have to make what they can from any official communique given to them after a meeting by the United Nations' delegates. As for the Communist version, this is not given out until later, in a broadcast from Peking.

And so this is Panmunjom (previously Kaesong) where for nearly two years, these frustrating talks have continued unceasingly to try and achieve an agreement to end the fighting in Korea, which if ever it can be reached, may well prove to be the key to future world peace.

### *Koje Do*

No story of recent events in Korea can be complete without a brief reference being made to the unpleasant events that have been taking place during the last year in the Communist prison camps on Kojé Do Island, which lies twenty miles off the coast from Pusan.

At the end of May, 1952, news was suddenly released of an uprising of Communists prisoners on the island, where 80,000 enemy had been confined in a number of large prison compounds, guarded by a totally inadequate number of American troops. In due course it was ascertained that the prisoners had succeeded in gaining almost complete control of their compounds, to such an extent that no guard had dared to enter any one of them for many months. Finally the uprising had culminated in the American Commander of the island being suddenly dragged across the wire, into one of the compounds and made a prisoner himself.

As a result of this incident, additional troops had to be rushed to the island to obtain his release and restore order. This resulted in considerable bloodshed, and subsequently, when the whole position was fully investigated, a number of shocking revelations and much inefficiency came to light.

There is no doubt that most of the trouble in the camps, which has

continued intermittently since the first rebellion, has been caused deliberately by a small band of fanatical Communist terrorists, receiving instructions and assistance for co-ordinated action from outside.

But the incidents at Kojé Do have certainly provided the Communists with valuable propaganda material, which they have not been slow to use to the best advantage. At the same time the failure to maintain law and order on Kojé Do Island has certainly done much harm to the good name of the United Nations Forces in Korea.

### *Korean Winter*

Although the overall situation in Korea seems to change constantly, there is never much change in the kind of winter experienced there, which to-day has a reputation of being one of the most unpleasant in the World.

The winter starts towards the end of November and continues to the end of March. During these months, most of the country is covered with thick snow and subjected to icy winds, which sweep down the peninsula from Siberia, and cause considerable variations in temperature, which often drops as low as  $-18^{\circ}$  at night.

Needless to say all rivers and streams are frozen over throughout the winter, and roads are covered almost permanently with a thin layer of ice until the thaw sets in.

Man management in Korea during the winter is a matter of great importance for in extreme cold, men are liable to become sluggish both mentally and physically. This can lead to apathy which results in men lacking the energy to take normal battle precautions.

To endure extreme cold it is essential for every man to have a warm and reasonably comfortable hole or shelter where he can rest when off-duty. Sleep is always a vital necessity and for this warmth is needed from underneath as protection from the frozen ground, as opposed to piles of clothes on top, which only results in stopping circulation. Food is required as often as possible and really hot drinks at regular intervals. Also it has to be remembered at all times that in real cold, wet or damp clothing will freeze in a matter of minutes. Therefore when moving about, men have to wear the minimum, with everything else kept in reserve to put on the moment when they can rest.

But despite the physical discomforts caused by the cold, the United Nations Forces have found that provided men are suitably clothed and observe the elementary precautions laid down, bitter cold need not impose any serious loss in fighting efficiency. However, supervision has to be constant and detailed in order to make every man comply automatically and unfailingly at all times with the basic and proven rules.

Finally, if a man refuses to make the effort, then in order to safeguard his life, discipline bordering on the harsh has to be imposed as the only sure remedy to bring him to his senses.

### *Command*

To conclude, it is perhaps of historical interest to record the major changes in the United Nations High Command in Korea that have occurred during the last year.

During the summer of 1952, General Ridgeway replaced General

Eisenhower in Europe, and was himself succeeded by General Mark Clark as United Nations Supreme Commander. Then early in 1953, General Van Fleet relinquished Command of the 8 U.S. Army to General Maxwell Taylor. With regard to our Commonwealth Division, Major-General M. M. A. R. West succeeded Major-General A. J. H. Cassels in September, 1952, when he was promoted to Lieutenant-General and to the Command of 1 Corps in B.A.O.R. Finally, it is perhaps of interest to note that in August, 1952, Major-General Shoosmith was appointed a Deputy Chief of Staff to General Mark Clark, thus becoming the first senior British Officer to serve on the staff of the United Nations Higher Command in Japan and Korea.

## PART II

### COMMUNIST FORCES IN KOREA

For a period of nearly three years the United Nations forces have been engaged in fighting a major war against Russian trained Communist forces in Korea. Perhaps, therefore it is of interest to consider some of the facts that have been learnt about these Communist forces.

#### *North Korean Peoples Army*

It is sometimes forgotten that the first Communist attack in Korea was made, not by the Chinese, but by the North Korean Peoples Army (NKPA). This army was of course entirely a Russian creation, built up during the previous five years of Communist domination of North Korea. Thus the army was organised on similar lines to that of the Russians, and virtually all its arms and equipment were of Soviet design and origin.

As in most armies, the basic tactical formation of the NKPA was the infantry division with a total strength of approximately 11,000 men, and well equipped with automatic and heavy infantry weapons. However the division had no organic artillery and there was a serious deficiency of supporting armour and aircraft.

The majority of personnel in the NKPA were Koreans, many of whom had lived in Manchuria or Russia and had previously served in either the Russian or Chinese Armies. Some other personnel had also served as regular soldiers in the Japanese Army during the Second World War. The remainder of their soldiers were conscripts, many of whom were captured at the end of 1950, when they were found to be very poor material.

On many occasions, personnel of the NKPA revealed themselves to be cruel by nature and apparently thinking nothing of brutal treatment, either of each other or their enemies. In this matter it is interesting to remember that many of the Japanese atrocities in the Second World War were in fact carried out by Koreans, serving in the Japanese Army. Nevertheless the North Koreans proved themselves to be very tough fighting soldiers and capable of enduring almost any hardship.

In the ranks of the NKPA the number of ardent Communists was found to be comparatively small, but nevertheless all obeyed orders without hesitation and fought hard, especially when the fortunes of war were running in their favour. Most of the North Korean officers were certainly

Communists, but even so their indoctrination appeared to be mainly superficial, and in many cases was probably professed for convenience and the hope of personal advantage. However the presence of Communist "Political Advisers", down to battalion level, ensured the maintenance of rigid Communist control at all times.

The actual fighting history of the NKPA in Korea has not been particularly glorious. When the army launched its treacherous attack in June, 1950, its leaders believed that they could gain an easy victory over the weak South Korean forces, and quickly overrun the whole of the peninsula.

For a brief period of two months, all went well, and the NKPA was able to make a spectacular advance of nearly three hundred miles down the Korean peninsula, meeting opposition from only a few South Korean and American units. But when United Nations re-inforcements began to reach Korea, the situation rapidly changed.

The front was stabilised in the nick of time to form the Pusan perimeter, from whence in mid-September, 1950, the United Nations launched their counter offensive, which resulted in a crushing defeat of the NKPA.

In the course of eight weeks, the NKPA was driven out of the whole of South Korea, and then forced to retreat as far north as the area of the River Yalu, that forms the Manchurian-Korean border. During this withdrawal, more than half the NKPA was completely destroyed, and the total number of personnel killed and captured by the United Nations forces reached the fantastic figure of over 100,000, while losses in equipment and material were in the same proportion.

By the end of November, 1950, it was clear that as a fighting force the NKPA, virtually had ceased to exist, and but for the Chinese intervention, it is more than probable that Christmas 1950 would have seen the end of the War in Korea, as well as a United Nations victory.

After their defeat, the NKPA had to be reformed almost from nothing, while the Chinese Communist Army took over the whole of the Communist effort in Korea, thus becoming the principal enemy of the United Nations forces.

During the last two years, the NKPA has continued to fight in Korea, but no longer as an independent force, but as a puppet army of the Chinese Communists and without any real individual identity. For a brief period, its name had flickered across the pages of history, but its period of glory was but a moment, to be followed immediately by a crushing defeat and virtual oblivion.

#### *Chinese Communist Forces.*

The first appearance of Chinese Communist Forces (CCF) in Korea was confirmed in October, 1950, following the complete defeat of the NKPA by the United Nations Forces. Then on the night of November 26, 1950, the CCF started their first offensive which was destined to drive the United Nations Forces out of North Korea, and far back behind the 38th Parallel.

For the next nine months very heavy fighting took place between the CCF and United Nations Forces, with each army in turn gaining the initiative. Eventually in the summer of 1951, the front line was at last

stabilised, roughly along the 38th Parallel, and the completely static war started, which has continued to the present time.

With regard to the Chinese ground forces who have been opposed to the United Nations since the end of 1950, once again the basic tactical formation is the infantry division, made up of three regiments each of three battalions. Usually three divisions are grouped together to form an army (roughly equivalent to a British corps) with a total strength of about 30,000 men.

After the front became static, the enemy appeared to organise much of his front line armour into a number of small individual units, each acting independently as a kind of roving artillery. During the last year few cases have been reported of the enemy attempting to use his armour other than as mobile guns. However, it can not be considered these enemy tactics are in any way unusual, since the pattern of the front line ground does not lend itself to the use of armour in the normal way. Finally, the majority of the Chinese armoured units have been equipped with the T34 medium tank, mounting an 85 mm gun, and this tank is the one used extensively by the Soviet Army during the Second World War.

All CCF infantry divisions now have their own organic artillery of varying number of guns. The enemy has also used a number of artillery divisions, consisting of up to four regiments each of thirty-six guns. One or more regiments are then placed in support of armies as required. The majority of the CCF artillery units are armed with 75/76 mm. guns. The enemy also has employed a number of 105 mm. and 152 mm. guns, as well as at least one rocket launcher regiment. In the early days of the Chinese intervention, their army was woefully short of artillery, but to-day this shortage has been made up to a very marked degree.

Initially it appeared that the engineer and signal resources in the infantry division were very limited, while by Western standards their medical organisation was very primitive. However, once again, to-day it appears that steps have been taken to remedy these weaknesses, especially in respect of communications.

Standard infantry weapons used by the CCF have been the rifle and stick grenade, a 7.62 mm. light machine gun, and Soviet carbines. In addition infantry battalions are equipped with 60 and 82 mm. mortars, machine guns, and some bazookas and recoilless rifles. The enemy has always appeared to use many different types of weapons, which undoubtedly must create considerable ammunition and maintenance problems. However, it is reasonable to assume, the ultimate aim will be to equip the whole of the CCF with exactly the same type of weapons as the Soviet Army.

The amount of motor transport organic to CCF units is undoubtedly small by Western standards, and no division is allowed to have a large administrative tail. In Korea considerable use has been made of horse transport, mules, and coolie labour for maintenance, most of which is requisitioned from the civilian population. Also rations and quarters are obtained in the same way, to the maximum degree possible. Undoubtedly these methods offset the need for a rigid administrative procedure as used by Western Armies. At the same time, it is to be remembered that the Chinese at War are a ruthless race and they think nothing of employing these cruel methods when need arises. However, their administrative methods, although on the face appearing to be primitive, have stood the

test under the prevailing conditions in Korea, and therefore can not be lightly dismissed as ineffective and unsound.

With regard to the Chinese soldiers themselves, the majority of those who have been captured have been found to be mainly of the peasant class, simple and ignorant although physically tough and used to a life of discomfort and hardship.

It has been ascertained that conscription in the CCF is for an indefinite period with soldiers receiving food and clothing, a very small amount of pay, and sometimes a small grant of land to his family, a concession which is a great attraction. Therefore, it is probable that many soldiers feel that they are well off in the army, as opposed to living their normal life as a peasant or coolie.

Due to their illiteracy, Chinese soldiers often appear to be very stupid and lacking in initiative. Very few have any technical ability and although tough, ignorance and suspicion of elementary hygiene causes a high rate of non-battle casualties.

With regard to their political beliefs, once again, due to ignorance, the majority of Chinese soldiers individually appear to be perfectly willing to believe any ideology they are told to follow. Their superficial Communist indoctrination is a comparatively simple matter.

Probably the most marked characteristics of Chinese soldiers are their apparent disregard of the discomforts of War, and blind acceptance of discipline and authority. Thus without being a complete fanatic, in battle, he is undoubtedly very brave and not afraid to face death. This makes him a dangerous opponent, who on no account can be under-rated.

### *Enemy Tactics*

During the first year of the War, both the CCF and NKPA were mainly infantry forces, woefully short of adequate armour, artillery, and air support. However as the Communists possessed an overwhelming superiority in numbers, it was possible for this weakness to be accepted, and the enemy was able to achieve a series of spectacular victories by launching mass attacks and saturating the numerically inferior United Nations Forces by sheer weight of numbers.

However as the strength of the United Nations Forces began to increase, eventually the Communists began to learn to their cost that victories could not be won by manpower alone, when opposed to superior armour, artillery, and air power. Therefore they were forced to call a halt to their offensives, and try to remedy these deficiencies, especially in respect of artillery.

With regard to infantry tactics, in the main, the enemy was content to follow normal methods in both attack and defence.

Prior to an offensive he usually subjects his objective to a series of minor probes, sometimes extending over a period of several weeks. The aim is to seek out weak spots, determine forward positions and the location of automatic weapons, wire, and minefields. When ready to assault, invariably he favours superiority in numbers, seeking to overrun defences by sheer weight of numbers. In addition a major attack is nearly always accompanied by a number of diversionary attacks to the flanks.

In the early days of the war when the enemy attacked without adequate artillery support, enormous casualties were stoically accepted. However

by the end of 1952, when the deficiency of artillery had been made up, he became able to support his attacks with heavy artillery fire, which greatly reduced his casualties and made the task of the United Nations' defenders very much harder than previously.

During an attack, the enemy will follow artillery concentrations very closely, and on occasions he has been known to occupy an objective, even before his own artillery fire has lifted.

The main weapons of assaulting infantry are always the grenade and sub-machine guns, with heavy close support fire provided by mortars and machine guns, which are brought forward at great speed behind advancing infantry.

Probably due to inferior communications enemy plans often appear to lack flexibility and if an attack goes wrong, it is liable to become completely disorganised. However if an objective is captured, the enemy digs in very rapidly and soon consolidates the position, making a counter attack a major and difficult operation.

Of course when defending, the most impressive feature of the capabilities of the Communists in Korea has been their fantastic skill and energy in digging. Enormous effort is expended continuously in digging miles of deep trenches, weapon pits, and bunkers, the latter often with several storeys below ground level. Also nothing is thought of even burrowing through the tops of hills, starting from reverse slopes, to make perfectly concealed and almost impregnable weapon positions. Once a complete network of trenches and bunkers has been completed in a sector, the enemy can virtually live completely under-ground and concentrate forces at any given point without being seen.

When defending, the enemy appears to be willing to surrender ground that is not essential to the main position, but when a determined attack is made to capture vital ground, then he defends almost fanatically.

In Korea, the enemy has favoured defence in depth on a narrow front. If a forward locality is overrun, the enemy has withdrawn to the next prepared defensive position in the rear, but not without leaving behind small groups of well-armed suicide troops to fire from deep holes in the rear of the attacking forces. These parties will go on firing until killed or captured. Counter attack plans are prepared and somehow always launched with very great speed.

Probably the defensive tactics of the Communists in Korea can be best summed up in the words of their own rather naive tactical doctrine which states :

If the enemy attacks, we defend.

If his attacks are too strong, we withdraw.

When he is tired, we attack.

When he withdraws, we will pursue and kill.

Since the War became static, due to the air superiority of the United Nations, the enemy has tended to do almost all his fighting at night. As a consequence the Communist soldiers have become very skilled night fighters, and they wage a ceaseless struggle in the darkness to try and dominate the No Man's Land between the two armies. Their skill in fighting in the darkness is one of the most important lessons that has been learnt in the War by the United Nations Forces.



*Summary*

The fact cannot be denied that the last year has revealed to the World that the Chinese Army that exists in Korea to-day is a modern war machine of great strength. There is also no doubt that with the assistance of Soviet Russia, Communist China has the manpower resources to make her army even stronger.

The sudden rise of Communist China as a great military power in the Far East is a development of great significance and one that is fraught with danger for the Western Powers, in the event of another World War. At the same time, it can only be hoped that the military setbacks that the Chinese Army has suffered in Korea will not be unheeded, and that both China and Russia will accept the fact that the Free World is ready to fight bitterly to prevent Communist domination of the Far East.

## PART III

## MILITARY SITUATION APRIL 1952 TO MARCH 1953

On June 25, 1953, the War in Korea will have been in progress for exactly three years, and although at the time of writing, there are at least some indications that the Communists are seriously considering a settlement of the Korean problem, it is still too early to know whether this is anything but a hope, as opposed to a certainty.

To try and describe the military course of the War during the last twelve months is no easy task, for a situation has prevailed almost unique in any other modern war. Since the front became static during the summer of 1951, a complete deadlock at the front has continued to exist until to-day, with both sides holding strong defensive lines in wild and mountainous country, and apparently neither capable or desirous of attempting to make any further major advance.

Therefore during the last year, as in most wars, there have been no great offensives in Korea resulting in advances and withdrawals which can be marked on maps. No battles have been fought for vital towns or villages making them names that echo throughout the World. Probably the best description of the kind of war that has been fought, is that given by a senior British Officer who described the fighting as the "Passchendaele of the hilltops".

If an attempt is made to summarise the military situation in Korea during the last twelve months, it is considered that the United Nations have concentrated all their efforts on achieving three principal military aims as follows

- (1) To maintain their existing positions in the face of any enemy attack, while at the same time inflicting the maximum number of casualties on the enemy at all times, with the minimum losses to our troops.
- (2) To continue to maintain air superiority throughout the whole theatre.
- (3) To build up the strength of the army of the Republic of Korea, to such an extent that eventually this army will be able to play the major part in the defence of its own country.

Therefore, it is interesting to consider how, and to what extent, the United Nations Forces have achieved these three aims during the last year.

*Ground Operations*

With regard to the course of the actual land fighting itself, this has of course been of a completely static nature as far as ground is concerned, but this has not prevented much bitter fighting from taking place.

The present front line is approximately one hundred and fifty miles long running through country that is both rugged and wild. The ground consists of an almost unbroken series of hills and sharp ridges, that run in all directions, which makes it infinitely suitable for defence.

In the area of the front line, there are no towns and few villages that have not been completely devastated and no civilians are allowed in a wide belt behind the front.

To-day there is a vast network of roads leading forward, that have had to be built by the army engineers under appalling difficulties, along routes that previously were nothing but tracks. They are rough, in many places very narrow, and a prey to the constant changes in the weather conditions. Throughout the winter months, they are covered on top with an inch of ice, making them as slippery as a skating rink. Then for the remaining months of the year, dependent whether it is hot or wet, they are either axle deep in mud and water or give off blinding clouds of dust. Therefore it is not surprising that even with a static front, maintenance of the forward troops is often difficult and hazardous.

Up at the front itself, the United Nations Forces are now well dug in, with miles of deep trenches, and innumerable bunkers, strong points, underground command and artillery observation posts, all linked up with an elaborate communication system.

At the same time, the enemy is equally well dug in, and with their infinite patience, they have gone underground even more than the United Nations Forces. Their trenches run not only along the front line, but extend many miles to the rear, while every hill is honeycombed with strong points of great strength, and almost impregnable to anything but a direct hit with an artillery shell or bomb.

To-day both Armies are very heavily armed, and can put down a tremendous volume of fire at a moment's notice. In the early days of the War, the Communists were woefully short of artillery and ammunition, but to-day this deficiency has been made up to a marked degree. Now, as in the case of the United Nations Forces, they are capable of shelling heavily, any position or area of contact, although the United Nations artillery is still superior on account of its higher degree of training and flexibility. This increase in the Communist strength is certainly an unwelcome development for the United Nations Forces, when compared with the position that prevailed in the early days of the war.

Probably the strangest feature of the War during the last year, is the fact that it has been one that has been fought almost entirely under the cover of darkness.

During the day, the whole length of the front, more often than not, is completely quiet, except for desultory shelling which goes on all the time by both armies. Day after day, hundreds of United Nations sentries and observers stare out across the lifeless valleys that separate the positions of the two armies, while friendly reconnaissance aircraft maintain a ceaseless patrol overhead, but seldom is any significant enemy movement ever seen.

And so, behind the reverse slopes of their hill positions, the United Nations troops just wait, whiling away the daylight hours attempting to sleep, read, write letters, and keep cool, warm, or dry, dependent on the season of the year. Often when the sun shines, and the quietness is particularly marked, it is indeed hard to realise that there is a war going on at all.

But later, as the shadows lengthen and the day begins to draw to a close, gradually activity returns to the front line. The troops stir themselves and move up to their bunkers and battle positions. Arms and ammunition and all the other impedimenta needed for fighting are checked and tested. Men earmarked for the night's patrols, digging, wiring, and mine-laying, assemble. Everywhere there begins to be felt an atmosphere of tension and alertness.

Then comes the darkness, and anything can happen.

Patrols from both sides begin to steal out into No Man's Land on their unending quest of checking up on enemy dispositions, to seek any information however small, and above all to try and capture a prisoner for identification purposes. Some nights, especially when it is very dark or the weather is particularly bad, there is little to report and few contacts. But on other nights, often when the moon is half full, suddenly bitter battles will flare up all along the whole front. Patrol contacts are made, leading to short, sharp, and furious fire fights in the darkness. Or for no apparent reason, the enemy suddenly launches a series of heavy attacks of at least battalion strength, in half a dozen widely separated places against some small United Nations outpost, or even a forward company on the Main Line of Resistance.

These attacks are supported by heavy artillery fire, and throughout the night confused and bitter fighting takes place, often of a hand to hand nature and with both sides suffering heavy casualties. But when the dawn begins to break, more often than not, the fighting dies down, as suddenly as it started, as if both sides had agreed mutually to break off the engagement.

Many of these Communist attacks are of a very vicious nature, and sometimes they result in a United Nations outpost or position being overrun, usually due to the enemy attacking with a vast superiority in numbers.

It is probably true to say that the loss of any position, however unimportant, is something that is most feared by every commander and soldier in Korea to-day, for under the conditions that have prevailed during the last year, it has been necessary to accept an unwritten law, that on no account must one yard of ground be surrendered to the enemy. If it happens, then at all costs it must be recaptured.

On many occasions, the necessity to suffer casualties to recapture some barren outpost hill position, militarily often appears to be unsound, and hard to understand. But at the same time, it has to be accepted, that it is of vital importance that at all times the enemy must never be allowed to achieve any success however small, that might lead him to think there is any weakness in the United Nations defences, and so encourage him to launch further stronger offensives, that might achieve greater military successes, that could be used as a bargaining influence in cease fire negotiations.

And so any minor success achieved by the enemy, immediately has to

be neutralised and turned to a defeat. If a hill is lost, in some sector, the United Nations Forces immediately assume the offensive and launch attack after attack until the position is regained, or the casualties inflicted on the enemy are so heavy, that he is made to realise without a shadow of doubt, that any attempt to launch a full-scale offensive will cause him nothing but a blood bath. But it cannot be denied that these operations often result in a series of bloody engagements, and sometimes it may be even weeks before honour is completely satisfied.

And so this is the kind of War that has continued to be fought in Korea during the last year. It is a War that has been labelled "phoney", because it has become a War of defence, and one with no apparent way of achieving a major victory. But night after night, bitter and vicious fighting has gone on unceasingly, and when morning comes, there are always to be seen small parties carrying down off the barren hills to waiting helicopters, some of their comrades in arms, who will never fight again.

### *Air Operations*

Turning from the land fighting to the Air War, once again the last twelve months have produced no really drastic change in the overall position. Despite numerous reports that the Communists now possess an air force of well over a thousand modern jet aircraft, the United Nations have continued to maintain virtually a complete air superiority in the Korean theatre. The continued acceptance of this state of affairs by the enemy is something that has been hard to understand, if in fact he does possess the air strength with which he is credited.

During the early days of the war, when fluid operations were in progress, the intervention of fighter bombers in close support of ground troops was often decisive. But since the front became static, the effectiveness of this form of attack has become somewhat reduced, due to the energy and skill of the enemy in digging deep and in concealing his positions. Nevertheless the ability of the United Nations Air Forces to continue to maintain an air umbrella over the front line has always been of incalculable value, in that it has allowed the United Nations ground troops free movement during the day, while at the same time forcing the enemy to remain motionless, and making it virtually impossible to undertake any kind of operations or large scale troop movement, except under the cover of darkness.

But probably the most decisive work done by the United Nations Air Forces during the last twelve months, has been their bombing of enemy rear areas.

Thousands of tons of high explosive have continued to be dropped all over North Korea on every likely military target, and reliable reports have been received continually of the crippling damage that has been done to North Korean industrial capacity and communications. One day history may well reveal, as in the case of the bombing of Germany in the Second World War, that the effect of this bombing was the main reason why the Communists have been impotent to launch any further offensive since the summer of 1951. Also it may well be the main reason why the Communists have to date been unable to employ their air force in any strength, due to it being impossible for them to construct under fire,

forward air landing grounds in North Korea, from where their aircraft could attack the United Nations front line and rear areas.

Nevertheless during the last twelve months, the enemy has certainly made some efforts to try and prevent the United Nations air bombing attacks, especially by day. To-day United Nations aircraft are constantly engaged by heavy anti-aircraft fire, and are liable to attack by Russian built MiG fighters operating from airfields just inside the Manchurian border, which are immune from United Nations attack. The MiG has certainly proved itself to be an excellent aircraft, and those that have appeared in the sky are capably handled, presumably by Russian trained Chinese pilots. But seldom have they been able to do more than harass the United Nations aircraft.

No comments on the air situation in Korea during the last year would be complete without a brief reference to the work that has continued to be done by the United Nations helicopters, as ambulances and staff cars. These weird-looking planes have gone on doing invaluable work evacuating casualties and saving commanders and senior staff officers many hours of time, by their ability to take off and land almost anywhere. But it is important that the value of the helicopter is not over-estimated, because of its success in Korea. It must be remembered that here they can be used to the maximum advantage, because of the complete air superiority enjoyed by the United Nations, a condition that is unlikely to exist to such a degree in any future major war.

Finally perhaps attention needs to be drawn to one dangerous aspect of the air situation that has prevailed in Korea. Troops who are not subjected to air attack, all too soon begin to believe it will never happen, and tend to ignore all normal precautionary measures. During the last year the enemy has continued to feel the meaning of hostile air power, and has now become air conscious all the time. To date the United Nations Forces have not yet had to learn this lesson.

### *Army of the Republic of Korea*

And so we come to the third and last principal aim of the United Nations Forces during the last year, namely, the development of the Army of the Republic of Korea.

This Army was originally formed on a small scale in 1945, more or less as Border Constabulary, but by 1950 when the War in Korea started, it had risen in strength to approximately 75,000. However, the Army was poorly armed, without any artillery, tanks, or air support, and thus was quite incapable of waging total war.

During the early phases of the War, practically all the personnel of the original army were either killed or captured during the retreat southwards, so that when at last the front was temporarily stabilised around the Pusan perimeter, the Army had to be reformed, virtually from nothing.

This was started in earnest in August 1950 under American supervision, and it is indeed a tribute to their efforts that to-day the new ROK Army now has many fully-trained divisions fighting the Communists.

The continued development of the strength of the ROK Army has been one of the most significant events during the last year, and it is even further

heartening that recently President Eisenhower publicly advocated further expansion.

The need to increase the strength of the ROK Army is of course vitally important, as when the Korean War does eventually end, it will be essential for the Republic to have an army of sufficient strength that can defend their own country with a reasonable certainty of being able to withstand any future attempt of Communist conquest.

Of course the creation of a ROK Army is no easy task, and it is not something that can be done overnight. Although there is no serious shortage of manpower, it is mainly of the peasant class. Therefore there is a lack of mechanical and technical knowledge among the young men, which is a serious handicap. There are still many other military weaknesses such as lack of co-ordination, caused through lack of previous experience, and which only time can eradicate. Finally the Republic, as a country, has virtually no war industries and every item of major fighting equipment has to be obtained from the United States.

But on the other hand, during the last year the ROK Army has shown over and over again that it is becoming more efficient every day. Their infantry have proved themselves to be as good as any in Korea, and they fight with the greatest determination and bravery. Throughout the year, the army has continued to go from strength to strength, and with the many victories that have been won, so its pride and morale and fighting spirit has continued to increase. Therefore it is reasonable to hope, that in the event of the War continuing indefinitely, the day may well come in the foreseeable future when the ROK Army may well be able to take over the major part of the defence of their country.

#### PART IV THE FUTURE

At the time of writing it is extremely difficult to forecast what is likely to happen in Korea during the next few months.

As everyone knows, recently there has been an unexpected change in the attitude of the Communists towards the democratic nations, suggesting that at last they may be seriously contemplating trying to solve some of the existing World problems.

At any rate, this apparent change of heart has certainly resulted in dramatic developments in Korea, culminating in an exchange of sick and wounded prisoners, and an agreement by both sides to resume the cease fire talks in earnest. It has also been reported that Peking Radio has stated in a broadcast that the war will be over by 20th June.

And so once again there are great hopes that soon there will really be a cease fire in Korea, thus making it possible for political talks to start to try and achieve a final settlement of the whole problem.

But although hopes now run high, the fact must be faced that a political agreement over the future of Korea may not be easy to achieve. For eight years the country has been divided into virtually two separate states, each with a different political ideology. Both sides have a nucleus of a strong army and for nearly three years Korean has been killing Korean with zest. Thus a reconciliation of the two states will not be easy, and will need much give and take by all interested parties in the future of the country.

At the same time, it is probable that a settlement of the Korean dispute is really dependent on the attitude of the Communists to the other problems that also exist in respect of Germany, Austria, French Indo-China, and Malaya. If they are prepared to achieve an agreement in these countries as well as in Korea, then an early solution to the latter may well be possible.

But if the Communists are only prepared to agree to a cease fire, possibly for some ulterior motive, and nothing else in the world, it is hard to see how the conflicting views of the East, West, and the Koreans themselves over their country can ever be reconciled.

But from the military viewpoint only, if a cease fire results from the recent developments, that will mean everything to many thousands of United Nations Forces now fighting the War in Korea.

R. C. W. THOMAS

## CHAPTER XX

### MORALE IN WAR

BY MAJOR-GENERAL B. T. WILSON

MORALE is the French word "moral" respelt in order to preserve its pronunciation of origin. It first came into common use in the English language about 1831. Much of the evident distinction of the word probably derives from Napoleon's famous *Pensée No. 68* "*À la guerre, tout est moral, et le moral et l'opinion font plus de la moitié de la réalité.*"

That morale is important in war, was, of course, not a new idea. Many kings, rulers, and princes before Napoleon had known that the outcome of a great battle would depend on the spirit of their soldiers. In the noisy warfare of the Iliad, confidence is generally a forerunner of victory and despondency a herald of calamity. We read of the Roman generals listening anxiously to the cheers of their men at reveille to judge whether they are in good heart. Our own Elizabeth I, the warrior queen, delighted to communicate her ardour of soul not merely to her sailors and soldiers, but also to her people. And so on through the ages.

But Napoleon thought of morale more tremendously than his predecessors. The French revolution and its great wars were themselves phenomena vaster than any of the kind which had happened before. By his bold and adroit handling of a long sequence of stupendous events, Napoleon made himself master of France. As he did so, he grew acutely aware of the fears and of the passions which great political upheavals engender. His practical genius as a soldier also made him quick to see that the emotions of men could be harnessed to the business of war in a way which had not before been imagined. To him morale became just as material to war as men and horses, or guns and money. It could, moreover, be used with calculated effect to further victory. *Pensée No. 68* seems, indeed, almost as mathematical as a rule of thumb for working out the elevation of a gun.

Morale is, however, far from being a fixed mathematical quantity. It is far more a human factor, capable of great variations, which enters into all political and military affairs. As Napoleon was the father of modern morale, a glance at its variations in Europe during the Napoleonic period will be illuminating.

#### MORALE IN NAPOLEON'S EUROPE

The defeat of Great Britain by her American colonists in 1781 caused a moral stir in Europe of which it is difficult, now, to understand the magnitude. The Old World, to its amazement, saw a small but resolute community throw off the shackles of George III and become a republic of liberty and equality. Stifled for centuries by autocratic kings and a close-fisted aristocracy, France, too, became emboldened to have experiments in *liberté, égalité, fraternité*. The final result would have horrified the pioneers, but the start was intoxicating. The French nation came to feel that it was capable of prosperity. It secured to itself liberty and a deep sense of moral obligation to the new regime. Having dearly won such great advantages, France was prepared to die rather than surrender them.

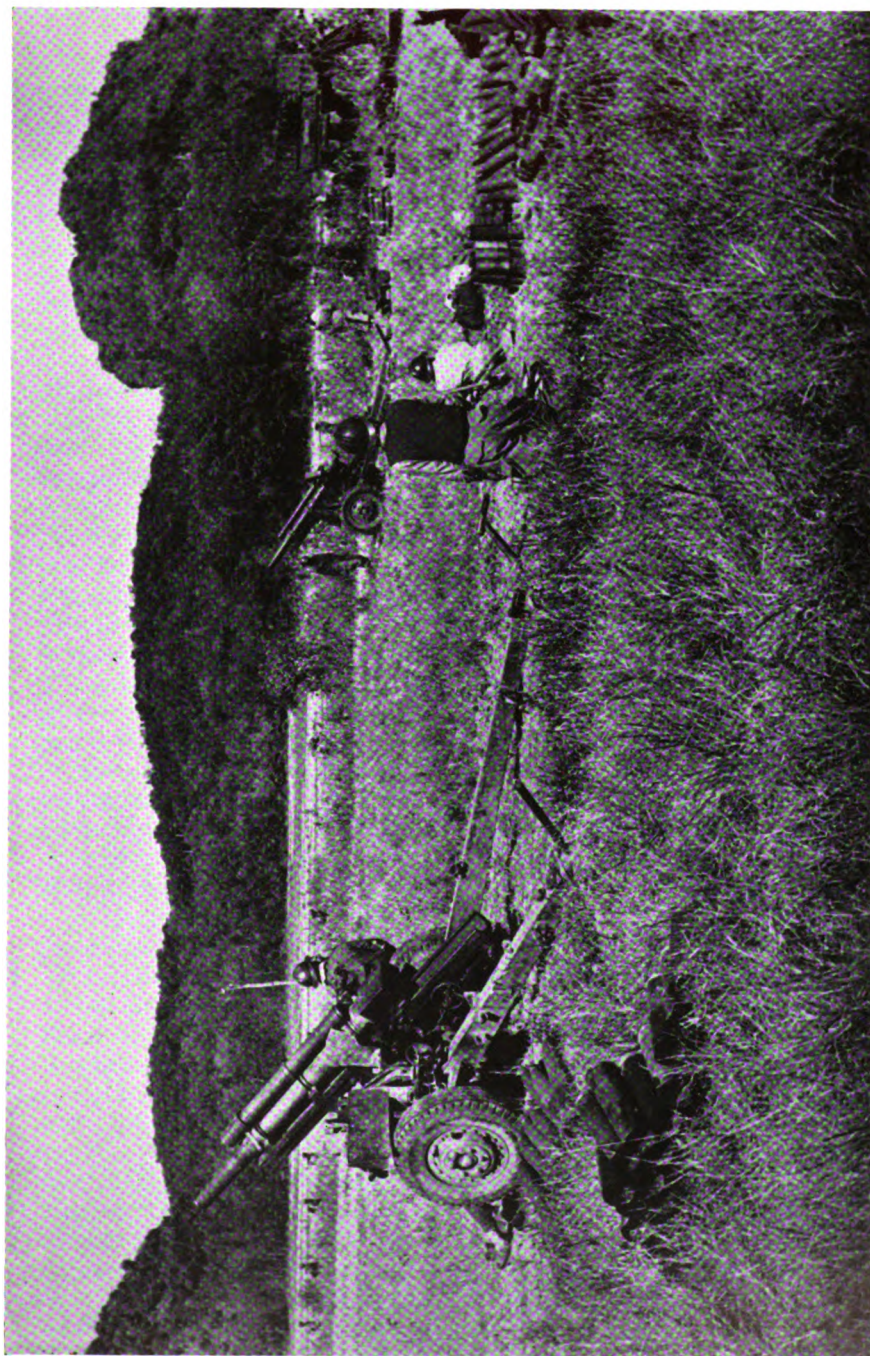


The absolute monarchs of the Continent, whose kingdoms were themselves ripe for radical changes, were much alarmed. They decided to crush the French revolution so as to safeguard their own crowns. But they did not reckon with the spirit which now animated France.

Even before the emergence of Napoleon, the hungry and ill-armed armies of Pichegru, Kleber, and Moreau proceeded to win a whole series of triumphs against the best troops in Europe.

Napoleon now appeared on the scene to shape the further course of the revolution. *Liberté, égalité, fraternité* made little appeal to his extraordinary mind. He did not admire the freedom which leads to revolt and chaos. Under his hand France became ordered and disciplined. His politics of conquest and dominion shaded inexorably into war as the occasion demanded. The morale of France and of her enemies had to be conditioned to suit them. At first, the ardours of the French people allowed Napoleon, as First Consul, to gallop on with a loose rein. At that early stage, he laid emphasis on the noble element in morale "*C'est dans le moral que se trouve la vraie noblesse: hors de là elle n'est nulle part*". Later on the inevitable miseries of war gave an evil twist to the dreams of universal happiness. Napoleon then had to sustain morale by artifice.

Fouché, Napoleon's double-crossing chief of police, was adept at influencing the morale both of friend and foe. He understood all the niceties of espionage and counter-espionage. Mail bags were opened and examined. The press was censored and controlled. Whispering campaigns were instigated. Napoleon is able to say on one critical occasion, "I have read them all, these letters: the art of opening and deciphering letters without leaving a mark has developed prodigiously." On another "Have caricatures made of an Englishman, purse in hand, imploring the various powers to take his money. This is the real direction to give the whole business." The editor of the *Journal of the Aisne* receives a directive "These articles should contain political reflections on the notable events of the reign of the Emperor. They should dwell upon the magnanimity of His Majesty, who has never ceased to offer peace to his conquered enemies and never had any object but universal peace and the freedom of the seas . . ." England was "a nation of shopkeepers" not to be feared as a military power. Wellington was "a Sepoy general" who did not understand European warfare. Thus a master in the mechanism of morale, Napoleon exploited to the full the haunting anxiety of the kings of Europe, that revolution in their own countries would be their undoing. Even after the débâcle of Moscow they were loth to take resolute action against the redoubtable man who understood the exercise of power so much better than they did themselves. No wonder that Napoleon exclaimed. "The kings have neither activity or decision of character. I do not fear old Europe." But the common people of Prussia were no longer in the pattern of "old Europe" and England never had been. Although without any understanding of liberty, Prussia was by this time ablaze for a united Germany under the Prussian King, whilst England had never ceased to strive for the downfall of Napoleon. It is not without significance, therefore, that the Prussian armies of 1813 played the chief part in the victory of Leipzig and that in 1815 England and Prussia together won the final battle of Waterloo.



The war in Indo-China. French artillery in action in support of an Infantry patrol  
(Associated Press Photo)



## THE MORALE OF THE CONTENDING ARMIES

The regular troops which the anxious monarchs of the Continent hastily collected together to stamp out the pestilence of the Revolution were not animated by any burning patriotism. They were just soldiers obeying orders. Their discipline was based on the lash and the firing squad. In Prussia particularly, blood, iron and brutality were commonly used to harden recruits for war. Ignorance was regarded as commendable, since an ignorant man harboured no dangerous thoughts and could be bullied into tolerable efficiency. It was thought good that a soldier should be more scared of his officer than of the enemy. Deserters were hunted down like criminals. When they were caught, they were shot. But soldiers were so often miserable that desertion never stopped.

In the brutal age of Frederick the Great an iron discipline of this kind worked well enough. The Prussian king saw to it that his officers were themselves strictly disciplined, besides being capable leaders inured to the rigours of war. What was true of Frederick's troops applied equally to the other armies of his day, since the conquering Prussians set all the military fashions. But during the generation of comparative peace which preceded the French revolution, the discipline of European armies deteriorated in a vital respect. That imposed on the rank and file was as harsh and as brutal as ever, but the discipline of the officers fell away. The experienced commanders, resting on their laurels, became old and ineffective. The young ones still came from famous military families, but preferred their ease to the labour of fitting themselves for war. As officers of this kind seldom obey orders with exactitude, the control of battles by superannuated commanders became extremely erratic. Generals themselves were insubordinate, even in their own armies. Where coalitions were in question, the confusion of purpose became complete and ruined all prospect of effective action.

In the French army conditions were very different—Napoleon quickly refashioned discipline in a way which assured the effective articulation of his formations in the field. Under his direction they learned to move across Europe with the facility of single battalions. His generals, like those of Sir Douglas Haig, either obeyed implicitly or were removed. Road construction, better couriers, and new methods of signalling gave him communications which were far superior to those of his opponents. The corps into which the army was now organised did not rely on field depots for their sustenance, but lived on the country by requisition. His new mechanism of command and logistics alone would have sufficed to win Napoleon great victories. But morale was also on his side. The fervour of the Revolution animated his armies. His officers and men formed a homogeneous entity, which was in harmony with the spirit of the age. The armies of "Old Europe" on the other hand, were hampered by an out-moded system of command and subordination.

If the enthusiasm of his soldiers flagged, Napoleon well knew how to create a thirst for glory. "Call it the battery of the fearless" he said at Toulon when confronted with difficulty in manning a bastion, which lay within pistol shot of British guns. He spurred on the ambitious with the famous reminder about the marshal's baton, which every private soldier carried in his knapsack. His headlong assault over the bridge a

Lodi enshrined him as "*le petit Caporal*" in the hearts of his men. So did many other sedulously cultivated legends. No one understood the glamour of war better. Witness the splendour of the regimental colours, the eagles of the Garde, the side drums and strident trumpets, the stirring effect of *Sambre et Meuse*.

The morale of the French armies of conquest, plunder, and propaganda held on wonderfully to the end. It flickered badly after Moscow, but in the main shone bright until it spluttered and finally went out as night fell on the battlefield of Waterloo.

Imperfect though it be, this brief review cannot but reveal something of Napoleon's mastery of morale. Concerning it, his *Maximes de Guerre* and *Pensées* scarcely date. Even now they can be read as a classic text-book, to which developments in morale since his time can all be related.

Morale seems to emerge from all this, more as an effect than as a prime cause and to depend on balance and vitality. A nation which is sound throws up great leaders who ensure its morale. A scrutiny of some of the later wars of the 19th and 20th centuries will confirm this.

#### CRIMEA 1854

In the Crimea, not for the first time in history, the innate but spasmodic perseverance of the Russian character catches the attention. Great Britain, surprisingly, was eager to go to war. Apart from these two features, the obliterating hand of time has left little worthy of memory except the bravery of the soldiery and Florence Nightingale. Thanks to her, the charnel houses, which disfigured all the old wars, gradually disappeared from modern ones—a decided milestone in the study of morale. The war was not a decisive one—leadership on both sides was mediocre—morale had to take care of itself.

#### THE AMERICAN CIVIL WAR

Morally speaking, this was a contest of giants. Dominating them all towers the figure of Abraham Lincoln. A statesman far ahead of his time, his utterances on democratic government would have delighted the Greek philosophers, quite as much as they do the modern world. The early misfortunes of the Federals only added to his will to win. Few statesmen in history have handled commanders with more patience and understanding. He noted, unmoved and with inimitable humour, that General Grant perhaps drank over much brandy, and that General Sherman was over-inclined to shoot disobedient officers. To him, these blemishes were but the defects of great virtues. Long before Winston Churchill did so in Europe, he settled the wartime relationship of politicians and soldiers by exercising general control himself. The leadership and morale of both North and South matched the outstanding quality of the Federal President. The fighting was as bitter as the cause of the quarrel. The morale of the defeated South lasted right up to Hitler's famous twelfth hour. The American nation was, in fact, getting into fine moral condition, hammering out of a vast and powerful system of democratic government.

### THE FRANCO-GERMAN WAR

The contrasting characters of Bismarck and Napoleon III guaranteed in advance that no nice balance of morale would be a feature of this war. Bismarck was completing his plan for the unification of Germany, which to all Germans was about two centuries overdue. Napoleon III, made Emperor by a succession of disreputable conspiracies, hoped to consolidate his dynasty by great victories in the field. A weak character and apt to fail in emergencies, he was not even in good health and his presence at the head of the state was a sign of that fatal weakness of government which was the bane of France then, and still is today. The fighting between the regular armies ended after six weeks at Sedan where the cardboard Emperor was made a prisoner of war. But the *levée en masse* under Gambetta fought on for another year with morale, which well revealed the angry humiliation of the French nation.

### RUSSO-JAPANESE WAR

This war brought into prominence the same intermittent perseverance of Russia which the Crimea made manifest. Discarding cold for hot warfare in their urge to establish themselves on the Pacific, the Russians attempted the almost impossible task of gaining a decisive success on the doorstep of what proved to be a first class naval and military power. Nevertheless the morale of the Russian troops in the desperate defence of Port Arthur was of the same dour persistency as that shown forty years later at Leningrad, Moscow, and Stalingrad. A sidelight on the unchanging springs of national action was the Japanese attack on the Russian fleet at Port Arthur without prior declaration of war. In 1941 at Pearl Harbour the American fleet was surprised much in the same way—a warning to all of the importance of reading history.

Like the Crimea, the Russo-Japanese war was not a decisive one, so that leadership and morale were not tested to breaking point on either side. Both strategy and tactics were uninspired. The fire of small arms dominated the battlefields, causing hideous casualties. Japan emerged from the war as a world power, whereas the blatant inefficiency of the Czarist regime hastened its eventual downfall.

### WORLD WAR I

The dismissal of Bismarck left the united Germany of his own making deprived of the measured leadership which this country, more than any other, so essentially needs. The Kaiser was swept into the war by a coterie of ambitious underlings, who set out to dominate Europe without sufficient resources for so vast an enterprise. The splendid appearance and morale of the German troops as they marched through Aix-la-Chapelle towards the West struck a chill of fear into the hearts of neutral observers. But when the war gamble failed at the Marne, the control of Germany gradually ceased to be the concern of the Kaiser and his government—it passed to a succession of military commanders. A rift began to separate the German people and their armed forces. The morale of one became out of tune with the other. When Ludendorf momentarily lost his nerve in the autumn of 1918, there was no moral support behind him. The whole moral structure of Germany collapsed: the war was lost.



Perhaps the most striking moral feature of the Allied war on the Western front was the unruffled composure of Sir Douglas Haig who, except for the disastrous first year, commanded the British army throughout. His recently published diaries, which are a most notable contribution to history, add to the impression of his calm certainty in ultimate victory. This was his great characteristic as a commander. Although outwardly without the lively understanding of British troops of a Wellington or a Montgomery, he retained the unswerving confidence of the army and of the nation throughout many appalling ordeals.

The iron chain of command from GHQ right down to platoons in the line withstood triumphantly all the stresses and strains which came upon it. Time after time the infantry, the "nerve of the army," went "over the top" with odds during the worst days no better than 4 to 1 against being killed, and 2 to 1 against being wounded. These are heavy odds for the bravest to face. Yet no collapse of morale such as afflicted the French after Verdun, the Italians after Caporetto and the Russians after their revolution, ever hampered the British army in the West.

Curiously enough, morale was but little considered in British military circles. Heavy casualties were thought to be inevitable in modern war. The morale of British troops was just taken for granted. To be able to make such a bold assumption and to be proved to be right did credit to Haig's sound judgement. In retrospect, however, his attitude rather recalls the comment of the French general at Balaclava "*C'est magnifique, mais ce n'est pas la guerre.*" History will perhaps judge Passchendaele in much the same manner.

Haig, indeed, perhaps lacked the lively and restless imagination which must enable a modern commander to be aware of the moral and physical condition of his army and at the same time to help it in its task by continuously bringing in new and more effective forms of warfare.

Despite this failing, Haig's moral control of an army in the field was masterly. Through many critical moments, often unsupported by a jealous Prime Minister, he and his devoted army fought on doggedly to play the chief part in bringing about the final downfall of Germany.

## WORLD WAR II

The dreadful tale of the Nazi tyranny is testimony enough to the disordered political condition of Germany before and during the war. Hitler's fiendish system secured to him the devotion of the German masses, who saw him as the saviour of their country. Fear and self interest constrained those who did not. German morale was thus an unhealthy amalgam of blind devotion and impotent *laissez-faire*. The predominating element of devotion inspired millions of men and women to hold on fanatically to the end. The *laissez-faire* of the more responsible people allowed Hitler to attempt to control the state as though it was a battalion of infantry. Such an amalgam of morale was ill suited to the complicated demands of a modern state engaged in a life and death struggle. The control of Germany's war effort became as disordered as the brain of her evil genius. Chaos was the inevitable end.

Italy under Mussolini recalls Aesop's fable of the bull frog and the bull. His bombastic plans bore no practical relation to Italy's limited resources. When he thrust Italy into the war in 1940 Italian morale wilted from the

start. France, which had suffered from faction and weak government for over a century, was morally more than half defeated before the war even began. The collapse of 1940 showed that her leaders, unlike the Roman Senate after Cannae, despaired of the republic. Morale could not flourish in such an atmosphere of political corruption.

The morale of Japan in 1940-45, where the military caste dominated the scene, ran a course which strangely resembles that of Germany in 1914-18. Japan, like Germany in that war, completely underestimated the moral-material grandeur of the U.S.A.—particularly at sea. It is astonishing that Japan, with her experience of the immense tonnage of mechanism which the maintenance of sea power entails, should have judged herself to be capable of matching the shipyards and the arsenals of America. Japanese morale derived from a national character which is fanatical and cruel—but cunning rather than intelligent. Like Germany in 1918, Japan did not fight to the bitter end but gave in quite suddenly when her leaders saw that the game was up. The fanaticism, which might have given the Allies so much trouble, was turned off like a tap. A curious lack of logic seems to pervade the formidable eastern kinds of morale, which makes them ultimately inferior to the more human ones of the West.

In 1941-45 the USSR reproduced, in the end, the same kind of morale that enabled the Czar Alexander and his feudal Russia of 1812 to destroy the *Grande Armée*. But at the beginning, both against the Finns and the Germans, the soldiery of the Soviets gained their moral poise somewhat haltingly. If Hitler had had the wit to pose as a liberator of Russia from the Communist yoke, the war in the east might have taken a different course. Fortunately or maybe unfortunately, he was at pains invariably to speak of Russians as sub-human (*Unmensch*) and fit only to be the slaves of the *Herrenvolk*. Such arrogance made it easy for Stalin to rouse the fierce patriotism of all Russians, no matter from what Soviet land they hailed. Forcefully led, the Soviets ended by fighting with the impressive morale of a sovereign and united people.

Winston Churchill and President Roosevelt were worthy of the peoples whose energies they so admirably directed during the war. Churchill, by general consent of the Commonwealth, became almost a dictator in the best tradition of Rome. Roosevelt had the absolute power which the American Constitution conferred upon him. From 1941 onwards these two men co-ordinated the war economies and fighting forces of the West with those of the U.S.S.R. under Stalin in the East. First Germany was strangled in Europe, then Japan was suffocated in the Pacific. The resources of the Commonwealth were at full stretch early in the war. Key points of its structure all over the globe became directly threatened by formidable dangers. Churchill's speeches were a measure of the magnitude of the crises and of the kind of morale which he expected and got from the Commonwealth.

The collective strength of the U.S.A., on the other hand, was far more than enough for victory. A great surplus of power was generously used after the war to help the whole world to recover from its economic prostration. This richness in skill, raw material and industrial power, set in the security of the New World in which it all came so rapidly to fruition, made the national morale of the U.S.A. virtually unassailable. Setbacks and discouragement could only be temporary and local. Fighting forces,



aircraft, ships and wonderful new machines of every kind poured in an unending stream to the vital points of the struggle. Indeed one of the great features of World War II was the fact that the U.S.A., for the first time, brought into action nearly her full strength as a world power at war. The result astounded friend and foe alike.

Clearly, rich resources developed in the security of a distant continent almost guarantee the ultimate morale of a sound nation, which disposes of them.

Another great feature, new to the Napoleonic age, is the emergence of total war, in which millions of civilians get killed, murdered or displaced.

The balance and vitality of a single nation is obviously not now enough to secure its ultimate morale in the total war of a world conflict. There must be great alliances. Sound nations with sound and powerful allies must be inseparable companions on the hard road to victory. Their leaders and their morale will derive from many nations and will be international. Nations are too small to stand alone in global warfare.

So far, morale has been considered in relation to the conditions under which it flourishes. But no examination would be worth much which did not attempt to study morale more objectively, i.e. in its relation to discouragement and fear.

#### MORALE AND FEAR

Different kinds of fear are the great enemies of morale. Some pessimistic philosophers go so far as to assert that fear affects human behaviour more than any other emotion. As a child begins to take in its surroundings, it becomes conscious of being afraid. The bold ones learn to subdue fear: some remain timid all their lives. Yet although fear in its different forms is at once an affliction and at the same time a preserver of mankind, no great literature explains it much.

The classics, to be sure, abound in vivid description of stark terror. Witness the caricature of the coward in the *Iliad* XIII (Pope)

"He shifts his place: his colour comes and goes,  
A dropping sweat creeps cold on every part  
Against his bosom beats his quivering heart  
Terror and death in his wild eye-balls stare  
With chattering teeth he stands and stiffening hair  
And looks a bloodless image of despair."

Aeschylus, whose experiences at Salamis and Marathon coloured everything he wrote, portrayed fear to such perfection in his tragedies that the spectators, themselves, were filled with horror. But the ancients do not seem to have investigated the nature of fear with the same thoroughness as they did love or the other devastating emotions of humanity. It is as though they shunned the horrible apparition, which they love to depict as a fleeting figure with a smoky torch and a set terrified grin.

In more modern times, Shakespeare tackles the subject with his incomparable insight and understanding. His tragedies delight the psychologist of today with studies of discouragement and anxiety as well as of the more pronounced aspects of fear and terror.

An intensive study of the world wars in which millions of men and

women suffered so much in mind as well as body has focussed attention on fear and its relation to morale.

In World War I fear was held in control by discipline of an old-fashioned kind. Alleged cowardice of both officers and men was, from time to time, punished by death just as it had been in earlier wars. These sentences of death in the field were horrible. They were tolerated only because an ultimate sanction for the maintenance of discipline is and always will be necessary. But the horror of shooting even a few terror-stricken deserters was not the whole evil. Growing knowledge of psychology also gave rise to uncomfortable suspicions that some of the shootings may have been unjust. The courts martial could not see into the minds of the individuals accused of cowardice and so really judge of their moral guilt. The benefit of any doubt in favour of the accused seemed rather to have faded away.

In World War II the death penalty for cowardice and desertion in the face of the enemy was still listed as a sanction in the British Manual of Military Law, but it was never enforced. The idea which underlies Voltaire's ironic comment "*dans ce pays-ci il est bon de tuer de temps en temps un amiral pour encourager les autres*" has perhaps become finally archaic in civilised countries. Morale must now rely for its strength on nobler measures than the death penalty. Such clemency has had military disadvantages. In Great Britain deserters ran into thousands instead of hundreds. Prisoners of war were perhaps even more numerous than the modern war of fast envelopments makes inevitable.

As the maintenance of morale is now a principle of war, it will be the business of the high commands of the fighting services to see that every man mobilised for war is cast for a part for which he is psychologically suited. Discipline and training of a higher kind will then do the rest.

Experienced soldiers know how the bonds of discipline carry them triumphantly through many a hot engagement. But the strain is great. When Shakespeare causes Henry V at Harfleur to exclaim "Once more unto the breach, dear friends, once more," he seems to sense the strain of battle. In the tenseness of modern war, it often becomes a question of how much more some of the combatants can go "unto the breach" without breaking down.

This fatigue of morale was not much heeded in 1914/18. Commanders were too inclined always to put their best units in the post of danger. Nor did the units thus honoured object. Noblesse oblige. But it gave them more than their fair share of special strain and robbed the others of the experience which would have added them also to the élite.

Napoleon, so merciless in his demands on his troops, understood, perfectly, that the pitcher of morale can go too often to the well of destruction. He never used his Old Guard unless he had to.

The modern nervous system is more sensitive than of old, but is backed by more awareness and resource. Given a spell of rest, it quickly recovers from exhaustion.

Regular relief from the strain of battle is accordingly enforced both on units and individuals. Men with especially tense jobs such as the crews of aircraft, submarines and armoured vehicles are carefully watched. To set a reasonable term to their ordeals is part of the new technique of war. Tactics and strategy must themselves be psychologically suitable to the

prevailing conditions, if they are to be successful. This, of course, has never escaped the attention of great leaders. The tactics of Wellington at Waterloo were psychologically suited to his stout-hearted, but inexperienced and ill-trained units. Montgomery shewed the same sort of flair in the critical weeks before the battle of Alamein, by relating his action to the shaken confidence of the Eighth Army.

The power of the mind tends more and more to displace mere physical courage in conditioning morale. Discipline and training require to enthral the minds of all ranks. Their morale will then rise to the heights.

#### MORALE IN THE ATOMIC AGE

In this atomic age, the art of war seems to stand on the threshold of immense changes. Ideas on tactics, strategy and civilian existence as they were understood in 1939-45 are likely to go into the melting pot together. How they will emerge no man can tell. One feature looms out fairly clearly from the mists of conjecture. It is that air power will be the supreme arbiter in war. Sufficient power in the air can safeguard peace or secure victory. Since the atomic projectile is *par excellence* a "blitz" weapon, attempts to devastate key areas are sooner or later to be expected in any future war. Mass morale must be studied on this supposition, particularly in Great Britain, virtually the whole of which is a vulnerable key area. To neglect to provide a skeleton cadre of Civil Defence and a multitude of small shelters in peacetime is tantamount to indifference to the risk of panic in time of war. Not to be able to return blow for blow would also be fatal to national morale: the attack always wins.

The huge populations of modern states are hypersensitive to news, which is fed to them up to the minute with astonishing speed by their own agencies and also those of the enemy. A war time controller of broadcasting and television will require to be a super-man in close touch with the head of the State. His knowledge of mass psychology must guard him from spreading either the deadly disease of discouragement or the disappointment which follows premature rejoicing. Since "the truth will out", truth must be his exacting mistress. To her, he will be unfaithful at his peril.

The moral importance of radio and television in the event of war is surely a strong argument against the commercialisation which some advocate in Great Britain. On the other hand, a Ministry of Truth in the manner of George Orwell's "1984" is to be shunned like a draught of poison. A broadcasting corporation, which stands aside, like a High Court of Justice, from commercial filth and political agitation, seems to be the ideal. After all the B.B.C. did not do so badly in 1939-45. Why not keep it and modify it according to the needs of the day?

The regular officers bear the brunt of the test of morale which comes upon the fighting services in the event of war. On them much of the military effort of the country will depend. In his "True Greatness of Kingdoms" Bacon says "The principal point of greatness in any state is to have a race of military men." This is a very wise remark. Nothing could be more disastrous to the morale of a people at war than to deliver the flower of their youth into the hands of any but the best obtainable regular officers. The old social system of Great Britain used to supply them almost automatically—sufficient in both quality and quantity. But

times have changed and many more officers than ever before are required. The British social revolution must find them, just as the French revolution produced *officers de carrière* for Napoleon's armies. It cannot be done quickly or cheaply. As the cold war drags on its hateful course through the years, it is not too much to expect that another "race of military men" will emerge to guarantee the greatness of a second Elizabethan age.

To ensure and maintain the morale of a single race of men, and their armed forces, is a noble, never-ending task. But, by itself, it is not enough. Irrespective of whether the future brings war or peace in its train, only by international team-work can the dangers which face humanity be overcome. In the years ahead the maintenance of morale will become an international problem or civilization will have perished.

B. T. WILSON

## CHAPTER XXI

### SYSTEMS OF ARMY TRAINING

BY GENERAL SIR HAROLD E. FRANKLYN

#### PART I. AN ANALYSIS OF TRAINING

IT is probably true to say that military training has too often lacked any definite purpose: although passable results may have been obtained as often as not, it is seldom that the very best use has been made of the time available. Without any definite plan, success has depended on the drive and initiative of a few commanders; in consequence there has been no uniform standard, although this fact may not have become fully apparent until put to the test of battle. The plan must provide for the direction of training and its constant supervision by experts who are not overburdened with other duties; it must allow for the development of essential military qualities as well as for the learning of techniques; it must be adjusted to the time likely to be available and to the number and calibre of the instructors.

In order to prepare formations for war the man in the ranks has to be made fit for battle; leaders have to be developed and new ones found; the collective training of teams has to be carried out; higher commanders and their staffs must be afforded opportunities of working together; finally formations must be given some experience in the methods calculated to ensure the best co-operation of all arms. These various processes need not be, in fact should not be, divided into watertight compartments. It has been too often the custom in the past to finish individual training before beginning collective training and then to complete each stage of the latter in a separately allotted period. If such a system is followed it will be found, too late, that when troops are expected to be ready for war there are still elementary weaknesses and no time left in which to eliminate them. It is easier to discuss each form of training separately in this article, nevertheless there should in actual practice be no such separation.

Although when preparing a formation for war the training of the individual is only one item, even if the most important, once the formation has become engaged in a campaign there will be few further opportunities for training, and the expectation of keeping up its efficiency must rest almost entirely on a supply of well-trained individuals being sent to it as reinforcements. Individual training, then, is doubly important and unless it is thorough in every respect the formation will inevitably fail, however brilliant its commander and however sound its battle technique. This being so it is proposed to discuss at some length the problem of how best to make a soldier.

The raw material from which a fully trained soldier has to be developed will vary markedly in different countries. The more a man has had to fend for himself, the more inherent will those qualities be without which a soldier is only a soldier in name. The greater his intelligence the easier will he find it to acquire the various military skills required in the arm of the service to which he belongs. Some of the finest potential soldiers

are to be found among natives, particularly where their livelihood, even their existence, has depended upon their alertness, self reliance and powers of endurance: on the other hand it is more than likely that their intelligence will be too low for them to learn the military skills which are essential. In contrast the civilised man, particularly if he has been bred and brought up in a city, has had his life ordered for him by custom, restricted by regulations and secured against any form of hardship. It is clear that these two extreme types of individual need completely different handling if the best results are to be obtained from each. There is a real danger that if too rigid a system of training is applied to the more primitive type of man, the very qualities which make him so potentially valuable as a soldier will be overlaid by a military veneer and so begin to lose their original edge. Anyone who has seen native soldiers, natural experts in bush warfare, obsessed when moving through difficult country with the idea of keeping strictly in line, as taught on the parade ground, will appreciate that the harm done by training will have outweighed the good. Again it is difficult to know what to do with such a soldier who, having scored a "Bull" on the rifle range, considers he has killed his quarry and that further shots are a waste of time and ammunition. Unless, however, these troops are subjected to strict military discipline they are quite likely when first in action to fire salvos into the air in the belief that the noise will suffice to frighten away their enemy. The problem of training these native troops in a way to preserve their natural and valuable instincts and yet to impose military discipline is not an easy one and clearly quite different from methods needed for a more civilised man. The latter will find no great difficulty in acquiring military skill and a fair standard of discipline, but it will be harder to develop in him those soldierly qualities without which his superficial military proficiency will be largely wasted. Even among civilised nations the same system for making soldiers out of civilians cannot be generally applied. The characteristics and outlook of the French, the Russians, the Americans and ourselves differ to such an extent that one system of training cannot produce the best results if applied to all of these. When considering methods applicable to British troops care must be taken in adopting training ideas which may be well suited to other nations but not to ourselves. We must also be chary of criticising other systems which do not accord with our own ideas of how training should be carried out. It is indeed dangerous to be dogmatic about training methods which may have to be applied in such varying circumstances.

Even in our own army the same system of character training, quite apart from the teaching of special techniques, should not be applied rigidly to all arms of the service. The infantry soldier, for instance, must be prepared to stand a greater strain in battle than other troops: on his feet and in the forefront of the fighting his power to endure is of transcending importance, for unless he possesses sufficient toughness and self reliance even the highest standard of military skill will be of little avail. In contrast the value of the technician in the rearward areas of a theatre of war will vary directly in accordance with his skill at his work: the dangers and hardships which he may be called upon to face may not exceed those encountered by his family living in a bombed city at home. In between these two extreme cases the emphasis on the development

of soldierly qualities, as compared with skill in techniques, will differ with each arm of the service.

The crux of the matter is to devise a system whereby a raw recruit may be made into a fighting soldier within a reasonable time. It is true that there may be opportunities later of effecting further improvement, but in wartime such opportunities are likely to be rare; thus everything depends on making the most of his initial training and so the planning and execution of a training programme which will be his first, and may be his last, is vitally important.

It may be thought that unless a recruit already possesses the qualities of self reliance and alertness and unless he has the will to endure there is little that can be done by training to develop these qualities. There are not many officers who know how to set about such a task, and as there is so much else to teach in a short time it may well seem to them better to concentrate on the obvious things. In actual fact it has been proved that the vitally important qualities can be developed at the same time as technical instruction is being given: if, however, it is found that some technical efficiency is being sacrificed it is still well worth while. As no system of training is of much value unless it caters for teaching military virtues as well as skill at arms, it may be useful to discuss the matter at length.

Self reliance is a compound of self confidence and a sense of responsibility. A man when he joins the army will usually find that however much self confidence he may have had in civilian life, it soon evaporates under such radically changed conditions. It is, therefore, necessary to build it up again as quickly as possible and the easiest way to do this is to convince him of the definite and continuous progress that he is making. Every stage of training should be punctuated by tests, for as each test is passed it will be manifest that another step has been taken along the road to efficiency. Provided the early tests are not too difficult a recruit will gradually acquire military self confidence, and as this confidence grows he is laying the foundations of self reliance.

So much in military life tends to atrophy a sense of personal responsibility, for a man is continually being told what to do and too often how to do it. To a certain extent this may be inevitable, but the amount of "spoon feeding" in the British Army, and perhaps in other armies, is fantastic. Men of average intelligence should be able to get from one place to another without being marched there: a sufficiency of clocks in camp or barracks should obviate the necessity of bugle calls and these are only two examples of a way of life which is not only out of date but actually harmful. Again, the bad instructor will overteach his pupils, whereas the good instructor will always be trying to make them responsible for their own progress: the first lesson in a new weapon normally includes a description of its mechanism; this is entirely wrong, for the pupils should try and find out for themselves by trial and error how it works. There are of course, many ways in which a sense of responsibility can be developed directly: men should constantly be thrown on their own resources during training both by day and by night, opportunities should also be given as often as possible for men to command their own sub-units temporarily. Enough examples have perhaps been given to show that there is plenty of scope in the Army for fostering self reliance provided that its importance is appreciated.

In war a man's life and often the safety of others may depend on his degree of alertness, and whilst this is true in all forms of warfare it is of particular importance in the jungle or bush. In civilian life men are accustomed to be alert for short periods only, for instance when crossing a street, but this will not suffice for war where continuous alertness perhaps for hours at a time may be vital. Until a man has been trained to be on his toes for an indefinite period he will soon become mentally tired and will not be able to resist the temptation to relax. Training plans, therefore, must be so devised that no one is allowed to relax when he feels like doing so, but on the contrary is kept at full stretch for progressively increasing periods.

The average man is mentally lazy for there are few who have had to exercise their minds as they have their bodies. The expert instructor will recognise that look of rapt attention which may conceal quite alien thoughts or possibly nothing at all: he will drive his pupils so hard that they will be mentally exhausted by the end of the day, until gradually their minds will become fit enough to achieve continuous alertness. As, however, few instructors are of such a calibre it is necessary to evolve a system by which the average instructor can attain much the same result.

Very few individuals can learn just by listening: the more that they are made to do things or to criticise the actions of others, the less will they be able to relax. There is no better way of keeping men thoroughly keyed up and alert than by drill, but it must be really good drill; a fine drill instructor will be able to keep a great many men at full stretch for an appreciable time. In contrast any form of weapon training or technical instruction requires small squads and the maximum possible number of weapons or equipment: nothing is so inimical to alertness as allowing twenty or thirty men to cluster round and peer at one piece of equipment. The pool of instructors, therefore, must be so distributed that the minimum are detailed for drill, physical training, and the like, so freeing as many as possible for those items which need a great deal of personal supervision.

The atmosphere which surrounds training must be a bracing one so that, apart from time for meals and some relaxation, life must be a continuous whirl from dawn to dusk. In order to produce such a state of affairs a great deal of organisation is required: there must be no queuing or waiting for something to happen, such as waiting to be tested, to see the medical officer, or to draw a pair of boots from the Quartermaster. It has always been a commonplace in the military life for soldiers to spend so much time waiting for something to happen, yet loafing in this way soon becomes a habit, and a habit which destroys alertness.

Any form of competition, whether between teams or between individuals, will enliven the duller subject; there is no better tonic at training than a spirit of rivalry. Routine in any shape will deaden keenness, but any novel idea will stimulate interest until the novelty wears off: then it is time for yet another new idea.

If there is a spirit of real enthusiasm permeating the whole of the instructional staff an atmosphere will be created in which alertness will flourish and in which teaching can be carried out more rapidly and much more efficiently. Enthusiasm must be made to spread from the top downwards:



a commanding officer must handle the training machine personally and not just stand and watch it running; this is not possible unless he is an expert trainer, however good he may be in battle, as an administrator, or as a disciplinarian.

Alertness can of course be taught, like self reliance, by direct methods: practice in observation both when stationary and on the move, by day and by night, and in country where incidents have been specially prepared, will form the foundation of this type of training. Alertness is probably the easiest of the great military qualities to develop and without it instruction in any subject will suffer: in fact alertness forms the basis of all training besides being a soldierly virtue in its own right.

For infantry certainly, and to a lesser extent for other arms of the Service, the power to endure is the most important of all those military qualities which a soldier ought to possess and yet it is probably the most difficult of all to develop by training. It is comparatively easy to make a man's body capable of great physical endurance. In doing so it is important to keep within each individual's capacity, for if he is never allowed to exceed what he can stand, he will not know his own limitations: once he has been allowed to fail he will not be surprised at failing again, and without doubt there is a habit of failure just as there is a habit of success. Assuming that a man has been made physically tough, the power to endure hardship and danger becomes mainly a matter of the mind: the necessary mental stamina can be developed to a great extent through building up pride and self respect and by inculcating discipline. Many individuals and a surprising number of units fail to stand the test of battle because they have not been prepared by the right means to meet this test.

From the very first week of a recruit's service he must have it dinned into him that in the corps or regiment which he has just had the honour to join there is only one standard, i.e. the very best, whatever the circumstances or conditions may be. It is of course useless to expect such an ambitious standard unless the officers and N.C.O.s believe in it and act up to it themselves. In a unit or training establishment where this ideal is most nearly reached good soldiers will be produced; on the other hand where this ideal is not even aimed at there can be nothing but failure, however proficient the teaching.

Pride and self respect cannot be easily developed in depressing or sordid surroundings, and yet by no means every camp or barracks supplies the clean, smart and stimulating conditions that are needed. Some have seen fit in their ignorance to sneer at the idea of providing bedside lamps, rugs, curtains and pictures, but such amenities are of definite value for increasing a man's self respect.

A recruit must of course wear the badge of his corps or regiment from the day on which he joins the army: the issue of a general service badge to be worn by all arms, as was done during primary training in 1944 and 1945, is utterly wrong. The excellent plan adopted by the French army, and to a certain extent in the American army, of rewarding whole units for exceptional gallantry in battle and thereafter permitting them to wear distinctive badges, might well be copied by the British army. A proof of the value of rewarding a whole unit rather than an individual is afforded by the way in which British regiments cling tenaciously to any distinction in uniform, which may or may not have been justified by events of the past.

There is no doubt that self respect can be enhanced by insistence on perfect "Turn-out": no half measures will suffice, and although this is generally recognised, it is only in the very best units that officers and N.C.O.s make a point of being present when men are preparing their clothing and equipment for the next day. It is curious that at the beginning of a war there often seems to be doubt as to whether army bands can serve any useful purpose, and yet it does not take long to realise their value. Martial music particularly if combined with ceremonial drill still has the effect of making a man feel proud of himself.

Although pride and self respect will help materially to sustain men in battle, they are not by themselves sufficient to overcome the worst crises. It has always been essential, as it still is, to superimpose a high standard of corporate discipline; in fact instinctive obedience without thought or hesitation. It is difficult for civilians or for anyone who has not experienced the strains of battle to appreciate that blind obedience, and nothing else, may be the decisive factor in the last resort. No one has so far found a better way of inculcating corporate discipline than through drill: constant drill, not necessarily for long periods at a time, will inevitably develop a habit of obedience. It has been suggested at times that there is a form of voluntary discipline when a man submits himself willingly because he understands the reason for so doing: this may be true, but such discipline will not suffice to overcome circumstances which may seem beyond what a reasonable man can be expected to endure. Granted that men have in some measure acquired the highest form of discipline and assuming that they are imbued with esprit de corps and further that they would feel ashamed of themselves to show a low standard of behaviour, then the power to endure in battle may be expected with some confidence.

No one is likely to question the old maxim that in war the moral side is infinitely more important than the physical side: in terms of modern warfare it is generally agreed that the man is more important than the machine. It must surely, then, be equally true that the development of soldierly qualities at training, if this is possible, must be more important than the teaching of techniques; an attempt has been made to show that it is possible.

### TRAINING OF LEADERS

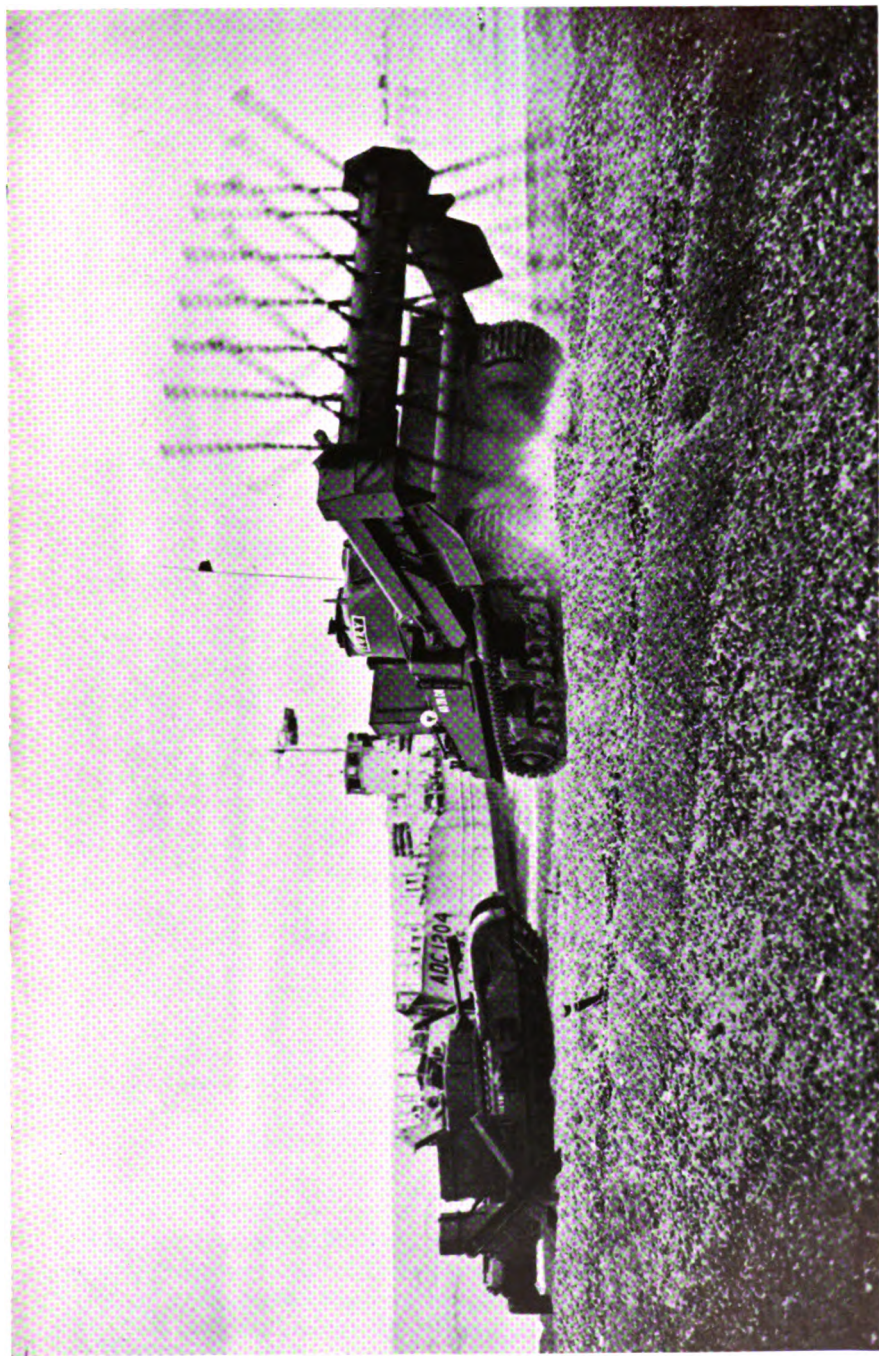
In peacetime the process of developing leaders can be a leisurely one. The very fact of commanding men continuously will become a habit which will survive, in most cases, the transition from peace to war. Even so, a great deal more can be done to produce a more inspiring type of leadership. Service in parts of the world, such as Africa, where young officers have to fend for themselves; exploring, hunting, sailing, mountaineering, and even games will teach men to rely on themselves and to make their own decisions. There can be no doubt that fighting under conditions like those of Malaya, where junior leaders have to depend entirely on their own judgment, provides the best training of all. Military knowledge too can be acquired gradually in peacetime, in fact by education rather than by cramming. Officers and N.C.O.s trained on these lines will have confidence in their powers of command and in being able to cope with such tactical problems as they are likely to encounter in war.

It is, however, a very different matter to try and develop leaders in a

hurry after war has broken out. It will be found that among the potential commanders there will be some men who seem born to lead and about them there need be no anxiety, but the majority will appear to lack any real aptitude. Picking leaders in such circumstances is a matter of guess-work, for often the quietest and most retiring men need the stimulus of battle to show their real worth: the inexperienced may be misled by the pushing, conceited type of man who will inevitably fail in a crisis. There is in fact only one practical test, which is to allow each man in turn to command his sub-unit and to watch carefully how he shapes. Eventually the most promising will have been selected, although the fact must be faced that there will have been many mistakes; now steps must be taken to strengthen their powers of leadership in the short time that is likely to be available. In camp or barracks the embryo leader will always find some senior, or even a contemporary, from whom to seek advice and guidance and in such conditions no progress will be made. It is essential that the tyro should be thrown entirely on his own resources and faced with problems when there is no one else to consult, with this end in view young officers and N.C.O.s should be sent off, with or without troops under their command, for several days at a time and given some task to perform with no possibility of gaining even moral support from others. There is no training comparable with this for producing self reliant leaders in a short time.

It is useless to expect to instill much tactical knowledge in a hurry. For the very junior commander the best solution to a tactical problem in battle may often be "Come on chaps." In any case theoretical instruction should be made as simple as possible. Whether tactical exercises are conducted on the ground, on cloth models or sand tables, each individual must be required to give his own solution and there must be no sheltering behind a syndicate answer. Instructors must remember that criticism of tactical solutions must be restrained and tactful: any danger of shaking the self confidence of a commander, however junior, must be avoided. A leader is more likely to achieve success in battle when carrying out a quite moderate plan, in which he believes, than if he wastes time in searching for the perfect answer; moreover the very fact of hesitation may adversely affect those under his command. The astute instructor will make each student criticise his own plan, for if a commander has come to a decision with his eyes open as to the defects in his solution, he is much less likely to be thrown off balance when the enemy finds and exploits the weaknesses which are inherent in even the very best plans.

The most valuable means of learning how to command troops in battle has always been, and still is, through collective training. There is no comparable method of acquiring the habit of controlling men under conditions which are as similar as possible to those of active service. As progress is made, whilst the tactical problems should remain simple, the difficulties of control should be increased by dispersion of troops, by working in closer country and by noise or other exciting influences. Whilst leaders are actually practising command they must not be subjected to any interference or immediate supervision. Provided that they make positive decisions and carry them through, there is unlikely to be much amiss in war: only when a commander adopts a negative attitude should he be severely criticised, but never in the presence of his own troops.



An episode in an amphibious assault exercise. A British "flail" tank in action. These tanks are used to beat the ground and detonate enemy mines



*The Training of Higher Commanders and Staffs*

Unless wars follow each other at short intervals it is unlikely that those appointed to command divisions or higher formations on active service will have had any war experience which will be of real help to them. They may well have commanded sub-units in battle or have filled junior staff appointments but this type of experience is not of much assistance to those called upon to fill such responsible positions: very few will even have had the opportunity of commanding a division on peacetime manoeuvres. Under these circumstances everything will depend on the standard of theoretical training reached by those appointed as senior commanders. It is probable that the problems involved during a forced retreat, as in May, 1940, are more difficult than in any other phase of warfare; as far as is known no adverse criticism has been made of any senior British commander during these operations and yet it is believed that few of them had previously commanded anything higher than a platoon, or the equivalent in other arms, in battle; further perhaps two of them, but no more, had commanded divisions on manoeuvres. Every one, however, of these senior British officers had spent a period of two years at one of the Staff Colleges studying the theory of war, and the majority had been instructors there. Granted then a comprehensive military education the task of commanding a division for the first time in battle should not present insuperable difficulty. Similarly a staff officer who has been properly taught in peacetime should not be unduly worried over staff work under conditions of war.

If time allows, however, after the outbreak of war it may be deemed advisable to give higher commanders the opportunity of practising command of their formations, provided that thereby more valuable training is not curtailed. In fact it is not essential for the troops to be on the ground when senior officers are being practised in command, moreover in exercises without troops such difficult situations can be created and these can be subjected to so many kaleidoscopic changes that the command of actual troops will appear comparatively easy. In the same way staff officers can be subjected to a greater strain if they have to perform staff work in a theoretical exercise, which has been specially designed to harry them, than where engaged on inter-divisional manoeuvres. It is important that the necessity of extra theoretical training for higher commanders and their staffs should have been foreseen and provided for. Hurried, improvised plans after the outbreak of war will not suffice, it is necessary that arrangements should have been made in advance for accommodation, for directing staff and for the actual preparation of schemes which will subject senior officers to a trial of skill and mental endurance.

*Collective Training*

The value of collective training in order to give leaders practical experience in command has already been discussed. The bridging of the gap between theory and actual war is particularly necessary for junior leaders, but is of less importance for officers above the rank of unit commander.

Another object of collective training is to show the individual soldier how he fits into a team and how he can make himself into a useful member of it. It will generally be found that in the novelty of the situation and



because of the many extra things to which he has to give his attention the lessons which he has learnt at individual training will often be forgotten. The remedy lies in taking the early stages of collective training very slowly and in interposing short periods during which faults in individual skill can be corrected.

It is necessary also to give teams practice in co-operating with other teams and with other arms. The average soldier is sufficiently intelligent nowadays to appreciate how the team to which he belongs fits into the larger pattern, provided this is shown and explained to him.

Lastly it may be possible to train teams to take part as such in war. This can, of course, only happen when a whole formation or unit will remain intact after training and will fight its first action without teams being disturbed. Such training is particularly valuable when reinforcements are being absorbed between battles. It is easy, however, to attach too much weight to the practising of actual teams: fighting value will depend far more on the spirit of the formation or unit than on the training of teams.

In every arm of the service except infantry and armoured troops there has always been, and still is, some form of battle drill or stereotyped procedure which will vary little under any circumstances of war. Until the end of the nineteenth century infantry, and to a lesser extent cavalry, did in fact rely on some form of drill for battle: then the necessity for extended formations led to its abandonment. When infantry was thus released from the restraint of drill in battle, a tendency developed in peacetime to evolve tactical ideas which were altogether too complicated to succeed under battle conditions. During the 1939-45 war efforts were made to revive battle drill: the idea was much favoured by some senior commanders and drastically criticised by others. Whilst it is true that any system of battle drill may break down under the stress of war, it may be useful to have some simple and well understood procedure for meeting the more likely problems of battle rather than to trust to the improvisation of the moment. If battle drill can be so devised as to assist junior commanders of infantry and of armoured troops to retain control of their sub-units in war, its value cannot be questioned. Whether, however, some form of battle drill be adopted or not, it is essential that tactical ideas should be kept as simple as possible. Between 1918 and 1939 there was a definite inclination to indulge in tactical elaborations on the training ground and this may well happen again. If tactical ideas are kept simple, then collective training will consist in trying to obtain perfection in the most simple and straightforward manœuvres. Such added interest as may be required will be found in making exercises realistic: live ammunition should be used as often as possible without undue consideration for safety precautions; the noise and element of danger will in some small degree prepare troops for the ordeal ahead. Sham fights between units have some merit as they arouse a feeling of rivalry, but as they often degenerate into unseemly squabbles it is seldom that a great deal of benefit is derived from them. A controlled enemy on the other hand can be used profitably to bring out those lessons, and only those lessons, that the director of the exercise wishes to emphasise.

It is probable that the best way to initiate each phase of collective training is by making full use of demonstrations. As it takes a long time

and much rehearsing before an effective demonstration can be staged, it is desirable that the actors should be kept together and used for this purpose only: improvised demonstrations are of little use and may do positive harm if unintentional mistakes are illustrated. As a result of being shown sound solutions to tactical problems, junior commanders will have something concrete to practise instead of being left to flounder without enough guidance. Demonstrations can also be used effectively to show how a conference at the end of an exercise should be carried out. So many conferences are dull and dreary affairs which meander along to a finish without purpose. All officers and senior N.C.O.s must learn how to stand up in front of the participants in an exercise and tell them frankly and decisively what was done well and what mistakes were made. Any commander who has been taught to sum up in a self confident and emphatic style will obtain infinitely better results than one who is diffident and hesitant, although his material may be better.

## PART II

### THE PREPARATION OF DIVISIONS FOR WAR

HAVING NOW discussed the question of training in general it remains to consider how various types of divisions can best be prepared for war. Methods will naturally vary appreciably according as to whether divisions are Regular, Territorial or newly formed such as the Kitchener divisions in 1914 or the bulk of American divisions from 1941 onwards.

The training of Regular divisions during peacetime presents no new or difficult problem provided that commanders are given enough time and sufficient opportunity. In the past there has been too much interference as the result of "Employment" and fatigues: "Tattoos" and similar activities have also been allowed to infringe on training time. Although these divisions will always form the spearhead of operations at the beginning of any war, the personnel is too valuable to be used undiluted in early battles. Some officers and a large number of N.C.O.s will, on the outbreak of war, be needed to act as instructors in non-Regular divisions and even to replace some of their commanders: a high peace establishment of officers and N.C.O.s in Regular divisions will enable the expansion of the army to be effected smoothly; without their help, as will be seen later, the rapid preparation of other divisions for war will be a matter of almost insuperable difficulty.

It is possible that Territorial divisions will be needed for active service immediately on the outbreak of war: they cannot of course, be fully fit for operational duty but the necessity to use them at once may be a vital one. In any case there cannot be much time available for training; it is likely to be a matter of weeks rather than months and so not a moment must be wasted through lack of foresight and planning. The first essential is that suitable training areas including accommodation should have been prepared beforehand: the idea cannot be entertained that, whilst camps are being got ready, training of any real value can be carried out elsewhere,



for only negligible progress will be made in such haphazard conditions. For each camp there must be allotted a permanent staff divided into an administrative wing and a training wing. The administrative wing, which can be composed of personnel unfit to fight, must be of sufficient size so that the burden of employment, fatigues, range parties and so on can be removed from those who can then concentrate all their efforts on training. The size of the training wing will depend entirely on the method of instruction chosen, but some efficient officers and N.C.O.s from outside the division will be invaluable.

As Territorial divisions become increasingly filled by National Servicemen the less necessary will it be to spend time on individual training after the outbreak of war, thus the main consideration will be the practice of leadership and teamwork. If time were not of first importance there is no doubt that divisions could gradually perfect themselves by the normal British methods which have been evolved through the years. These methods depend mainly on the principle that each unit and sub-unit commander should be entirely responsible for producing efficient and well led teams. From 1939 onwards second line Territorial divisions were in fact trained in this way, and most successfully too, although it took years to achieve good results. In the end, however, it is doubtful if there were any better divisions in the British Army.

The merits generally of what may be styled this British system as compared with American methods are discussed in detail later, but at the moment the particular case of a Territorial division training against time is being examined. It is not difficult to imagine the state of affairs when everyone is fully aware that training must be set going without delay and yet there are so many handicaps to be overcome: there have been many similar examples in the past and there will be others in the future, unless there have been foresight and planning. Unit and sub-unit commanders will be busily concerned with questions of personnel, stores and equipment: neither officers nor N.C.O.s will have a sufficient acquaintance with the training area to be able to prepare schemes quickly enough, even if they know how to set about such a task, and the main consideration will be to keep all ranks busy on something, almost anything, which might be useful. In the infantry there is usually recourse to route marches, for this is an easy solution and not without value. There is not, however, time available just to march there and back or round in a circle: route marches should be incidental to other forms of training, for instance to get to new ground at a distance or for platoon or section marches extending over several days. In other arms of the service there will be other devices for keeping everyone employed whilst units are settling down after mobilisation. In such circumstances, although a division may be officially deemed to be at training, no appreciable progress is in fact being made and some of the precious weeks prior to active service are wasted.

Some solution must be found to obviate a delay which cannot be afforded: nothing would be better than to attach to each unit a small but expert staff, assembled in time to have plans ready for initial training and so take the burden from the shoulders of the commanding officer until he is ready to bear it; unfortunately the number of skilled officers and N.C.O.s required would be beyond the resources likely to be available. The next best plan would seem to be to form such officers and N.C.O.s

into a central pool and for demonstrations to be prepared to assist commanders to handle the elementary stages of collective training: thus an impetus will be given so that training may be started at once and on the right lines. If a suitable amphitheatre can be found and if the running commentary can be relayed so as to be heard by all, a great number of officers and N.C.O.s can attend and derive full benefit. The criticism may be advanced that such a system may be too centralised, but it is difficult to adopt a more decentralised method until units are ready for it. As commanding officers manage to free themselves from administrative work, which will be heaviest during these early days, they will gradually be able to take over full responsibility for training: even then they can continue to make good use of divisional pools, particularly to set a standard of performance at which sub-units can aim. It has been the custom to accept a leisurely start to training as inevitable, perhaps because in the past there has not been such a need for urgency, but future wars are unlikely to permit a slow "build-up" after Regular divisions have stood the initial brunt and so Territorial divisions must be hurried forward in support.

If the number of divisions supplied by the Regular and Territorial armies is deemed insufficient and assuming that manpower allows of further expansion, then either the 1914 plan of raising completely new divisions or the 1939 plan, which consisted mainly of the Territorial army throwing off second line divisions, will have to be adopted. In the latter case, however, first line Territorial divisions will thereby be so diluted in all ranks and their training will thus be so delayed that it will be impossible to reinforce Regular divisions in time with formations fit to fight. If, then, the majority of Territorial divisions are required at the earliest possible moment, there is no other method of expanding the army than by raising entirely new divisions.

As far as is known no definite and complete plan has ever been formulated in the British army for the preparation of new divisions ready for war in the shortest possible time. In the past it has been left almost entirely to divisional commanders to make their own plans, although a great deal of assistance and advice has been placed at their disposal. The results that may be expected from such a policy must entail divisions being uneven in quality and the time when they will be ready for war will vary considerably.

Since it seems apparent that we have no accepted system for training new divisions it would be wise for us to examine the methods adopted in the United States, for there the problem has not only been scientifically studied, but practical experience has also been gained. The American army, faced with the difficulty of having insufficient trained commanders and instructors among the personnel of their newly raised divisions, felt compelled to centralise instruction under a special staff appointed to each divisional camp. By this means it was possible to make full use of those too old or otherwise unfit for war: moreover as the first échelon of divisions completed their preparation the staff, having profited by experience, must have been still more efficient for dealing with the next échelon: also it is evident that a staff which is able to concentrate all its time and energy on training only will become proficient instructors more quickly than officers and N.C.O.s belonging to the division who have to concern

themselves with interior economy, discipline and welfare. It was decided that the best way to get the fullest value from the instructional staff was to make each member an expert on one subject of individual training and that the men would thus derive great benefit by being taught each item by one who had been able to study it deeply. A rigid standard for each phase of individual and collective training was laid down and the degree of proficiency attained was constantly tested: in this way it was hoped to ensure a level of readiness for war throughout the division. In contrast we have preferred that most subjects of individual training should be taught by one and the same instructor and that the responsibility for conducting collective training should be decentralised almost entirely to commanders of all grades. It has in fact been said, perhaps with some truth, that we have adhered to the principle of craftsmanship whereas the Americans have tended to follow their inclination for the methods of mass production.

In the days when individual training was a relatively simple matter there was no great difficulty for the average instructor to teach his men everything that they required to know, but now that military technique has become so much more complex there are very few officers or N.C.O.s who can instruct in so many and varied subjects with maximum efficiency. Any instructor, however, who has sufficient opportunity of studying the characters of his pupils will be well prepared to drive the idle and to give extra attention and encouragement to the slow and backward. The expert, on the other hand, who perforce is always dealing with comparative strangers, will find it difficult to do otherwise than teach them all alike. Moreover the instructor who is able to get to know his men thoroughly can more easily inculcate self reliance, alertness, and esprit de corps than the expert whose sole concern is to impart knowledge. It can be said then that the American method is calculated to produce a higher standard of individual skill in the same time or an equal standard in a shorter time than the British method, provided that the pupils have a good average intelligence and are anxious to learn. The British system, whilst it takes longer to achieve the same level of efficiency, will be better able to cope with men of varying intelligence and powers of concentration and is more suitable for developing the great soldierly qualities according to the needs of each individual. It is probable that the American recruit is naturally more self reliant, alert, and intelligent than his British counterpart and that, in consequence, he responds satisfactorily to American methods, whilst British recruits tend to be more uneven in quality and require handling by an instructor who is given the chance of studying their individual capacity. It is clearly worth while, however, that we should be prepared, if the quickest possible results are imperative, to adopt in whole or in part a method of instruction whereby men are taught by a series of different experts. In any case if a pool of experts is attached to the division, they can be usefully employed in raising the standard of instructors and in replacing those absent on courses or sick. Moreover we might well incorporate in our system of individual training a comprehensive series of tests so that both instructors and the men themselves can accurately assess the progress being made.

The American plan for the collective training of their new divisions was intended to ensure that the minimum standard deemed sufficient

for war was reached equally by all units in the time allotted. It was appreciated that if units were left to their own devices some would rise considerably above this standard, whereas others would never reach it in time. As those who have commanded divisions in battle will know, there are solid advantages in being able to depend on an even quality among units: it is so difficult to guess where to locate the weaker units with the least risk and a bad guess may lead to disaster. In the same way as for individual training the responsibility for collective training was taken almost entirely out of the hands of American commanders and handed over to the camp training staff. Those tactical items which were thought to be the ones most likely to be encountered in war were taught in turn: each item was demonstrated by the staff and, after opportunity for practice, tests were held to ensure that the required standard had in fact been reached; then, and only then, was a fresh item undertaken on the same lines. In this way, progressing step by step, a considerable measure of efficiency in the selected subjects must have been reached, and the very fact of this obvious and steady progress must have had a heartening effect on all ranks in the division. At the same time there must surely be serious doubt as to whether it is really possible to prepare adequately for war in this way: there is much to be said in favour of a rehearsal for a specific operation over an accurately prepared replica of the ground, but any attempt to rehearse for battle in general by practising selected tactical items is unlikely to achieve the desired aim. The object of collective training should be to develop leadership and teamwork rather than to practise manoeuvres which may be of little practical use for any battle, when the conditions are likely to be utterly dissimilar from those encountered on the training ground. The theory of equality among units is an excellent one and doubtless the American system must have resulted in a level standard being attained within the strict tactical limits imposed. It is open to question, however, if more general battle efficiency would not have been acquired by employing more flexible training methods. It was noticeable, moreover, that when American divisions first arrived in Northern Ireland in 1942 their officers seemed to find that without the training machine to which they had become accustomed the task of continuing the preparation of formations for war a most difficult one. Although the majority of Americans did extremely well on their first introduction to battle, it must be remembered that their first operation was in many cases a setpiece battle which had been rehearsed; they might have found more difficulty if their first encounter with the enemy had been in a moving battle.

In the British army when entirely new divisions have had to be prepared, the methods chosen for learning collective training have been much less stereotyped. Under the general supervision of the divisional commander officers have been given a free hand to devise their own plans. As a rule progress has been slow, particularly at first, uneven throughout and no very high standard of tactical efficiency has been reached. On the other hand commanders of all grades have been forced to shoulder the responsibility for the training of the men whom they will lead in battle and so will have increased their self reliance; also because they appear to be conducting the training personally they will acquire more prestige with their men than if it is clear that they are merely following an exact pattern laid down for them.

It would perhaps be fair to say that the American system is too rigid and centralised and that too little scope is given to commanders to prepare the men whom they will have to lead in war, whilst the British system is so decentralised as to become rather haphazard. If a choice had to be made between adopting one or other of these two different methods in their entirety, the advantage would seem to lie with the American one for it is based on a real plan, and success at training depends so much on having a plan even if it is not the best. Usually when two entirely different lines have been followed in order to achieve the same result it is possible to find a middle way which is better than either: in any case no system is so perfect as not to be susceptible of improvement.

The British system depends on leaving a great deal to subordinate commanders who may not have enough skill and experience for the task. If this is so, the real control must be exercised by a more senior officer. It is generally accepted that in war the standard of divisions varies almost directly with the quality of their commanders: assuming this to be true in a theatre of war it is equally true on the training ground. From the outset the divisional commander must impose his personality on his subordinates and must make them conform exactly to the way in which he wishes even minor training to be carried out. In battle he must perforce leave many decisions to the man on the spot but at training he must overcome any reluctance to interfere. A division trained in this personal manner by its commander will make rapid progress, and when it goes on active service will already have full confidence in him. The issue of training directives couched in general terms and signed by a staff officer are of little value, the divisional commander must collect his subordinates and give them definite orders just as he would for battle, but they must be more rigid and in much greater detail. It will be of special assistance to him if he has at his disposal a body of demonstrators who can show to commanders of all ranks the precise manner in which he wishes collective training to be conducted. The purpose of these demonstrations should be less to show tactical solutions as patterns to copy, than to expound the best method of mounting an exercise, of controlling it and of bringing out the lessons arising from it: only commanders should attend, for it will be their duty to interpret what they have learnt to their men. With a good divisional commander a series of tests on American lines to ensure a uniform standard of collective training should be quite unnecessary: he can easily judge for himself when some units are lagging behind others and can take the appropriate measure, replacing unit commanders as necessary.

If then a greater degree of centralisation for collective training seems to be advisable in the British army, it is suggested that the method described above is a better way of achieving it than by handing over direction to a special training staff, however expert. Owing to the rapid expansion of the United States army, it may not have been possible to find enough skilled divisional commanders capable of handling from the outset the training of their formations. The men chosen to fill such responsible posts must, however, have possessed personality, drive and considerable intelligence: it would not have taken them long to acquire enough technique to supervise collective training: the opportunity could have been taken whilst their troops were at individual training. It is so much more satisfactory

for the divisional commander to take charge at the earliest possible moment and to continue in control until his troops are sent into battle.

To summarise the conclusions reached on the collective training of new divisions: the American system of camps with a special training staff allotted to each is an excellent one; this staff, however, must work under divisional control: tactical set-pieces are to be avoided; they should not be demonstrated, nor should tests be held to ensure a level standard of tactical progress: subordinate commanders should not be left too much to their own devices: above all the divisional commander must impose his wishes and take full control of the training machine.

The last point, which must be dealt with briefly, is the training of reinforcements to make good the war wastage which will occur in any type of division. Emphasis will clearly be laid on individual training which has already been discussed at some length. The main problem will be to provide the best method of supervision. Prior to 1944 the training of reinforcements in the British army was carried out in depots and in battalions scattered throughout the country and supervised by district and area commanders; these officers were too busy with other matters to give the time needed for the task so that results were unsatisfactory. In that year depots and other training establishments were grouped under divisional and brigade commanders, who were made responsible for the training of reinforcements and for nothing else. This plan worked smoothly and effectively so that a high-level standard of readiness for battle was achieved. There is no reason why all divisional units, and not only infantry, should be treated in a different way. Once again it is unquestionable that control by forceful and skilled divisional commanders works wonders. As soon as the training of reinforcements has been completed, it is important that they should be moved from a training division to a fighting division with the minimum of delay: nothing is so harmful to their morale as to be kept waiting and inactive in reinforcement camps under officers and N.C.O.s who are strange to them and who are unlikely to be of high quality. If circumstances make reinforcement camps inevitable, they must be grouped under a fighting commander, who is being rested from battle and who will be able to galvanise them so that real, valuable training can be continued.

It will have become apparent that attention has been focussed in this article mainly on the preparation for war of units and the ordinary human beings which these units comprise; for if the units are good the division to which they belong cannot be bad. It is comparatively easy to train a division so that it looks good to all outward appearances: it may be able to manoeuvre with skill and be adept at battle procedure and the co-operation of all arms, and yet it fails so often to meet the only test that counts, the test of war. There it is not easy to decide whether failure was due to the circumstances of that particular battle, which might have been too difficult for any division to overcome, or whether the fault is inherent in the division itself. In the latter case it will be too late to apply any satisfactory remedy, for if the formation is basically unsound it will take more time than can be afforded on active service to put matters right by further prolonged training. It is partially true that the best training for battle is in battle and it is, therefore, important to give an untried division an easy passage in its first engagement, if this is possible: then the basically

sound division will derive full benefit and may go from strength to strength. Divisions, however, which are not composed of units trained on general lines similar to those advocated in this article must always remain undependable until they have learnt by long and costly experiences on the battlefield the lessons which should have been engrained on the training ground.

HAROLD FRANKLYN

## CHAPTER XXII

### THE STRATEGIC DEPLOYMENT OF THE BRITISH ARMY

BY BRIGADIER C. N. BARCLAY

#### I

#### INTRODUCTION

IN the nineteenth century and in the first few years of the twentieth, when the defence of the British Empire was based solely on sea power, and we had no Continental land commitments, the tasks of the Army were twofold :

(a) To protect our overseas naval bases and the ports used by our merchant ships.

(b) To maintain law and order in the Colonial Empire, and protect our territories from enemies on their land frontiers, e.g. The North-West Frontier of India.

The Army was not of sufficient size, or properly trained and equipped, for large-scale operations. Consequently when such an occasion arose we were invariably ill-prepared and had to build up our strength, after hostilities commenced—as in South Africa (1899–1902).

Early in the present century the policy changed, and, as a result of our desire to preserve the balance of power in Europe, we entered into an “entente” with France which committed us to land operations on the Continent in the event of a German attack on France. That we were able to fulfil this obligation in 1914 was due to the reorganisation of the Army, initiated in 1906, by the then Secretary of State for War, Mr. Haldane.

To-day, although a very great and world-wide power, we are no longer the *leading* military power. In the Free World we take second place to our American friends, whose naval strength now greatly exceeds our own. The Russian Navy also exceeds our own in material strength. As a result of two great wars and the present division of the world into two irreconcilable and potentially hostile camps, our defence arrangements have been recast. The old idea of an Empire defence, based on the Royal Navy with the Army as a junior partner, has given place to a closely integrated defence by the three services, Navy, Army, and Air Force—not exclusively on a national or Commonwealth basis, but as a component part of the defence forces of the whole Free World. As a result the tasks of the Army can now be defined as :

(a) *Participation in the general defence of the Free World against attack by Communist Powers*, in the three areas :

Western Europe.

The Middle East.

South-East Asia and the Far East (including an actual campaign in Korea).



In some cases—Western Europe in particular—this task is being carried out by army formations and units which were originally sent to the same areas to occupy the territories of our late enemies.

(b) *Protection of our own and our friends' sea and air communications*—Gibraltar, Malta, etc.

(c) *Maintenance of law and order*—Malaya, Kenya, etc.

(d) *The defence, including part responsibility for the air defence, of Great Britain.*

In some cases the troops in an area fulfil more than one of these tasks. Our forces in Egypt, for instance, fulfil tasks (a) and (b).

## II

### THE PRINCIPLES GOVERNING THE DEPLOYMENT OF THE BRITISH ARMY

The term "deployment" in a military sense is usually associated with the preliminary moves before battle. In this article it refers to the more or less permanent location of troops to meet our various commitments. In this form of deployment—in what we call "peace" \*—the Army has a much more difficult task than the other Services. The Royal Navy lives and fights in its ships, which have the capacity to carry large quantities of ammunition, food, and other stores. Although certain conditions—such as reasonable port and dock facilities—are necessary, it is possible to transfer a powerful fleet from one side of the world to the other at comparatively short notice (see Chapter XVIII). Given adequate airfields and facility for fuel supply, a large air contingent can be concentrated in a given area very quickly. The number of personnel involved is not great and many of them move in the same "vehicles" as they fight.

The concentration of an army overseas, in a condition to fight efficiently at once is, however, a very complex business. The number of men involved is measured in tens and hundreds of thousands; vast numbers of tanks, guns, vehicles, and other heavy equipment, together with quantities of stores, have to be moved in a manner enabling them to arrive at the same time as the troops. The daily supply of such a force with food, ammunition, petrol, spare parts, etc., is an immense task, which involves frequent sea convoys and daily deliveries by rail and road.

Although it is now a normal procedure to move small forces of lightly equipped troops by air, a large army with its heavy equipment is still dependent on sea transport; and the speed of movement still dependent, in war, on the slowest ship in a convoy.

It should be noted that until the Napoleonic era the concentration, or deployment, of an army was chiefly a matter of moving *men*. Today the men have to be accompanied by a mass of heavy, specialised equipment. The movement, and maintenance in good condition, of this equipment is a much more formidable task than the movement of personnel.

Dispersion of force—resulting in weakness everywhere and strength nowhere—is a danger which the great captains have all been at pains to emphasise; but it is a principle which the British Army, particularly in

\* Present world conditions of "armed peace," or "semi-war," are discussed in Chapter V of this volume—"The New Warfare of the 1950s," by the same author.

peace, and very often in war, is driven to violate. Our far-flung Commonwealth, world-wide commitments, and the Army's multiplicity of tasks—dictated as they are by political and commercial as well as military considerations—make it necessary to disperse our land forces in “penny packets” all over the world.

Limitations of manpower \* also affect the problem. Our long-service personnel, recruited as they are under a voluntary system, nearly always fall short of requirements, and consequently most of our units consist of a high proportion of National Servicemen on a two-year engagement. This is not an ideal arrangement even for units in Europe, and is a very real disadvantage for those stationed in distant overseas theatres—such as Malaya, Hong Kong, and Korea. The system has, however, one very good feature. By posting ex-National Servicemen to the Territorial Army and Army Emergency Reserve for their period of part-time service, we have created a fine Reserve Army at home,† which would be ready for active service at a very early stage after the commencement of a major war. This has enabled us to dispense with a strong general reserve of active formations located in the United Kingdom, which would otherwise have been a very risky policy.

It is perhaps unnecessary to point out the extent to which the problem of the home authorities has been eased by the provision of forces from other parts of the Commonwealth—such as the fine Australian, Canadian, Indian, and New Zealand contingents forming part of the Commonwealth Division in Korea, and African troops serving in Far Eastern stations. Our old ally Nepal also provides eight battalions of Gurkhas, now serving in Malaya and Hong Kong. Without assistance from these sources the Imperial Army would indeed be hard pressed to fulfil its engagements.

This is the background against which we must view the deployment of the British Army—as part of a coalition of the forces of the Free World, working in close co-operation with our own and other navies and air forces; with a variety of world-wide tasks necessitating inconvenient dispersion; and with only just sufficient manpower to maintain units at their proper strengths.

### III

#### THE ACTIVE, OR WHOLE-TIME, ARMY

It will be appreciated that the deployment of our forces has a security aspect, and that full details are not available. Nevertheless, sufficient information is published from time to time to make practicable a general survey of how, and where, the British Army is employed.

The active army consists of the *equivalent* of just over eleven divisions—infantry and armoured. It must not be supposed, however, that our total forces are the equal of eleven divisions in fighting value. Many units located in small stations such as Gibraltar and Malta, and a few at home, are not part of any divisional organisation and it would take some time to collect and organise them on a higher level.

Moreover, we could never concentrate in one area, within a reasonable

\* See article “The Problem of Manpower in the Army,” in Chapter XXIV of this book.

† The system is described in detail in the article “The Reserve Army,” in Chapter XXIII of this volume.

time more than a proportion of the divisions which we *do* possess. With some formations and units in Germany and others in the Middle and Far East—all with definite commitments—any considerable transfer of troops from one part of the world to another is out of the question.

The following figures show, in general terms, the distribution of the active army:

				<i>Divisions, or equivalent of Divisions</i>		
United Kingdom	..	..	..	1½		
Germany	..	..	..	4*		
Europe (less Germany)	..	..	..	¾		
Middle East	..	..	..	2		
Malaya	..	..	..	1		
Hong Kong	..	..	..	1		
Korea	..	..	..	¾		
Miscellaneous	..	..	..	¾	—————	<i>Approximate Total</i> 11½ Divisions

It will now be as well to examine this figure of 11½ divisions in the light of the male strength of the active army. This on April 1, 1953, was approximately:

Regulars	..	..	..	218,000		
National Service	..	..	..	227,000	—————	Total 445,000 †

This works out at approximately 39,000 per division, whereas the actual strength of a division is less than half that number. To those who are unfamiliar with these matters this may seem a somewhat meagre number of divisions (or the equivalent of divisions) for the men available. The explanation is to be found in the large numbers of "overhead" administrative and instructional personnel who are outside the divisional organisation. (This matter is dealt with in greater detail later—in Section V of this article.)

#### IV

##### THE RESERVE, OR PART-TIME, ARMY

By this we mean the Territorial Army, the Army Emergency Reserve, ‡ and the Home Guard. Details connected with the Reserve Army are given in another chapter, and it will be sufficient here to explain its role and show to what extent the existence of the Reserve Army affects the deployment of the active army.

Its functions are twofold:

(a) Home defence, including major responsibility for the anti-aircraft defence of the United Kingdom.

(b) In the case of field formations and units of the Territorial Army and Supplementary Reserve units, to support the active army in the field as soon after hostilities, of a major nature, commence as possible.

These duties, although not fully appreciated by many, play a very important part in our defence arrangement, and have a great influence on

\* Three armoured and one infantry.

† In addition there are about 9,000 women in the W.R.A.C.

‡ Until 1952 the *Army Emergency Reserve* was known as the *Supplementary Reserve*.

the dispositions, and role, of the Active Army. By the Reserve Army's assumption of responsibility for home defence we have been able, since 1945, to dispense with a general reserve of regular troops located in the United Kingdom, which had hitherto been regarded as essential—and which is still very desirable.

The continuous influx of National Servicemen—all with two years regular service behind them, and many with experience in Korea, Malaya, and other operational, or semi-operational, theatres—is resulting in a much more efficient Territorial Army and Army Emergency Reserve than we have known previously in peace and units should be ready for war, not in a matter of months, but in a few weeks—in many cases in a few days after the order to mobilise.

## V

### AN EXAMINATION OF OUR PROBLEMS

It will be apparent to those who are familiar with the pre-war deployment of our forces that the present arrangements are a departure from some of our time-honoured principles.

We have, of necessity, abandoned the Cardwell system, under which Regular units were linked in pairs, with one in each pair stationed abroad and the other at home—the latter acting as a draft-finding unit for the one abroad, whilst collectively they provided a small general reserve. As explained, this has been made possible by the increased efficiency of the Reserve Army. On the other hand it has resulted in a much higher proportion of administrative units in relation to fighting troops. In the old days, when the army abroad was mainly concerned with internal security, many administrative units could be dispensed with in peace. Today, when a high proportion are engaged in active operations (as in Korea and Malaya), or have to be ready for war at short notice (as in Germany and the Middle East), these administrative units have to be maintained on a war footing.

The other major departure from custom is a result of conscription, which makes it necessary to mix short-service National Servicemen with long-service Regulars in active units. This was a step which some regarded with grave misgivings, it being held that “dilution” on the scale contemplated \* would result in a serious reduction in efficiency in Regular units. Fortunately these doubts have been almost entirely falsified. Due to improved training methods, the increased speed of transport, which has reduced the length of time which personnel take to join their units and return home, and the remarkable keenness and goodwill shown by National Servicemen, the active army has maintained a standard of battle-worthiness which is entirely satisfactory.

Having given the facts which govern the principles and explained some of the difficulties which operate, it will be profitable to conclude with a brief examination of the actual manner in which our land forces are disposed.

It is not proposed to discuss the wisdom, or otherwise, of the higher policy—often international rather than national in origin—which has resulted in troops being disposed in Korea, Egypt, Germany, etc. We

\* Many units contain more National Servicemen than Regulars.

will accept the political considerations which make it necessary for them to be there and confine our examination to the purely military aspects.

It would seem that our forces in Germany, Korea, Hong Kong, Malaya, and the Middle East are well balanced and could hardly be reduced below their present modest strengths. The disturbing factor is the complete absence of a general reserve. Any academic solution of the British Commonwealth's military problem which did not provide for a strong land force reserve—available for despatch to any threatened point—would be condemned: yet we do not possess one anywhere in the world, for the very good reason that our resources, when balanced against our commitments, do not permit such a luxury.

The reserve which we would wish to keep at home is, as far as the active army is concerned, almost negligible, comprising a few independent units, but with no higher field organisation. Our forces in Egypt—previously intended as a reserve for the Mediterranean, Middle East, and the Far East—has now ceased to be a reserve. It has even had to be reinforced in order to meet the disturbed local conditions in Egypt. At the time of writing negotiations are pending regarding the eventual location of this garrison. It is to be hoped that a solution will emerge which will permit our Middle East Land Forces reverting to their original, and proper, role—a mobile reserve for any threatened area outside Western Europe.

Another important aspect of the problem, mentioned earlier in the chapter, which it is essential to keep under constant review, is the long administrative tail—a subject about which a great deal of discussion has taken place and much has been written; but which tends to become aggravated rather than solved. In the days of primitive armies, living on the country in which they operated, practically every man was a fighting soldier. As armies increased in size and were equipped with more complicated weapons, so the need for administrative units and instructional establishments increased. To-day a fighting unit—artillery regiment, armoured unit or infantry battalion—contains many men whose normal duties are administrative, and who fight only in an emergency. A division consists of many units whose duties are purely administrative—Signals, R.A.S.C., R.E.M.E., etc., whose personnel are armed, but not trained to fight except in the last resort.

As the size of an army increases so the *proportion* of administrative troops increase, although the size of the division (infantry or armoured) remains fairly constant. As the reason for this is not apparent to those who have not studied the problem closely, some explanation is necessary. A field army usually consists of several divisions grouped in corps of two or more divisions each. Corps in turn are grouped in armies which, in the case of a very large force, may form an army group, such as the 21st Army Group in North-West Europe in 1944–45. Each superior headquarters has under its command certain troops—mostly, but not entirely, administrative—which are outside the divisions. These are known as corps, army and army group troops, as the case may be, and consist of additional Engineers, mechanical transport units, Military Police, medical units, anti-aircraft artillery, base camp and depots and many others. These, with the formation headquarters themselves, amount to a very large number of men. "Overheads" of this kind do not increase the strength





*(Associated Press Photo)*

Kenya. Operations against the Mau Mau. Men of the Lancashire Fusiliers resting near Nyeri after a raid in the Thomson's Falls area



of the actual divisions which do the front-line fighting, but they are necessary to maintain the divisions in the field in an efficient condition. This is not all, however, when we come to calculate the total strength of the land forces of a nation. In the case of our own country a large number of personnel are accounted for in the various installations and establishments at home—such as the War Office, Royal Military Academy, Staff College, and many other military educational establishments; depots and other training establishments; and a host of similar static units and installations, whose duties are mostly administrative, training, and educational.

Although these overheads are not maintained on the same scale in peace (or present semi-peace conditions) as they are in war, it is, nevertheless, necessary to maintain many of them against the possibility of mobilisation at short notice.

It is, therefore, apparent that although an infantry division may consist of only about 17,000 men, and an armoured division considerably less, many more officers and men than this are required for every division in existence, or the equivalent of divisions maintained in the form of independent units.

Circumstances change frequently and vary in different parts of the world; but the following statement, showing the proportion of fighting personnel within divisions, lower formations, and units compared with non-divisional troops (mostly, although not entirely, administrative or educational), can be taken as sufficiently accurate for practical purposes under average conditions:

(a) An infantry division of about 17,000 men consists of about 8,000 fighters and 9,000 non-fighters. An armoured division is in about the same proportion.

(b) In the case of a number of divisions in a corps, the corps troops (mostly administrative) brings the number of men required for each division up to about 25,000.

(c) In a large theatre of operations, with an army consisting of several corps, army troops (again mostly administrative) bring the figure up to some 32,000 per division.

(d) If the troops permanently located at home are included this brings the total up to about 39,000 men (or 40,000 men and women) \* for every division in, or capable of being put into, the field.

These figures—approximate and liable to fluctuation as they are—give an idea of the very small proportion of men in our land forces whose primary role is to kill or capture the enemy in combat. It is obvious that a modern army must have a high proportion of administrators, but it should be a primary duty of those concerned to scrutinise this problem frequently and ruthlessly, with the object of reducing administrative personnel and increasing the number of men whose primary role is to fight, or be prepared to fight, the Queen's enemies on the battlefield.

This matter is not entirely a material one: it has a moral aspect. The average young man, when he enters on his period of two years' national

\* With just over the equivalent of 11 active divisions these figures correspond very closely to the total numbers in the Active Army—445,000 men plus 9,000 women = Total 454,000.



service, does so in the belief that his services are urgently required for the security of the country. If he enters the Army he expects to be a soldier—a man who fights. It is very difficult to convince him that his presence is really necessary if he is given a job remote from fighting and akin to some occupation in civil life—where the emoluments are probably much higher.

## VI

### CONCLUSION

National and international policy and politics are outside the scope of this article; but it will not be out of place to conclude by emphasising what appear to be the main disabilities in the strategic deployment of our land forces—namely:

(a) The absence of a general reserve of the active army located at home.

(b) The employment of the bulk of our Middle East forces in Egypt in purely local defence, instead of as a general reserve for any part of the world outside Western Europe.

C. N. BARCLAY

## CHAPTER XXIII

### THE RESERVE ARMY, 1953

It is an old gibe that Britain always starts her wars with an army modelled on the requirements of the last one. In the past there may have been some substance in this accusation. To-day, however, it certainly cannot be levelled at Britain's Reserve Army.

The tempo of living and of war has been accelerated out of all recognition. Gone forever are the days when an army could prepare in a leisurely way for war and take the field in the knowledge that time had been on its side. In the unhappy event of war being forced on us again, our Reserve Army must be prepared to go into the line immediately.

These altered conditions led to a new requirement. Out of this requirement a "New Model" Reserve Army was born in 1950.

#### FOUNDATIONS OF THE NEW MODEL

The basic essentials upon which this new Reserve Army was modelled were:

- (a) a high state of readiness;
- (b) an adequate size for its tasks;  
(Here, other calls on the nation's manpower and money have had to be taken into account.)
- (c) a proper balance between arms and Services.

Faced with the task of creating this new reserve force, the War Office found two courses open to it; either, to graft the new model on to the existing Territorial Army (which had been reconstituted in 1947) and the Supplementary Reserve; or, to organise an entirely new force on the more conventional lines of a European national army.

Historians of the future will note how the current world situation led to the choice of the first of these alternatives. In 1950, time to re-organise Britain's reserve forces did not appear unlimited and the nation's economic situation militated against any radical re-organisation.

Thus, the Reserve Army consists to-day of two component parts—the Territorial Army and the Army Emergency Reserve (as the Supplementary Reserve was re-christened in 1952). Behind it (though not usually considered of it) stands the Home Guard.

#### ROLES AND NATURE OF THE TWO COMPONENTS

To obtain a true picture of these two component parts, it must be appreciated from the outset that each is complementary to the other; just as both, combined, are complementary to the Regular Army. Although the Territorial Army is the predominant partner in this entente, it could not take the field without the Army Emergency Reserve and both have to be maintained at the same state of readiness.

## THE TERRITORIAL ARMY

The roles of the Territorial Army are:

- (a) To provide the bulk of the Anti-Aircraft and Coast Defences of the United Kingdom.
- (b) With the Regular Army and units of the Army Emergency Reserve to provide a properly balanced field force, which is complete with all arms and technical units.
- (c) To support Civil Defence organisations in the event of heavy air attack.

Thus the Territorial Army finds the field force formations, most of the fighting units in the field force; the major part of Anti-Aircraft Command and all Coast Defence units.

On to its volunteer cadre is grafted most of those National Servicemen who have completed their two years' whole-time service with the Active Army and who have been drafted into the Reserve Army for a further period of 3½ years.

The main characteristic of the Territorial Army is its local nature. A Territorial unit is based on its Territorial Army Centre or "drill-hall". Its life and training are bounded by the ability of its men to attend training or social activities at this Territorial Army Centre in the evenings after their day's work and being able to return home later the same night. The number of men upon which it can draw is thus rigidly limited. Men cannot be drafted from one unit to another to bring any individual unit up to strength. It follows that in some areas it becomes very difficult to build units up to full strength and even harder to maintain them with men of the proper trades and skills. Nevertheless, in this parochial system lies the main strength of the Territorial Army because it has been possible to build on the traditions of many famous regiments and formations—to utilise the local spirit so strong in the hearts of the people in this country. Furthermore, the incorporation of local men only in each unit, increases the availability of volunteers and also ensures that training can be continuous throughout the year.

Thus (as will be seen in a later paragraph) Territorials not only carry out collective training at a fifteen days' annual camp but also train at their Territorial Army Centre on certain evenings each week, as well as at some week-ends.

### *The Army Emergency Reserve\**

The role of the Army Emergency Reserve (Category II) is:

To provide units, officers, and other ranks, who for geographical or other reasons cannot be provided by the Territorial Army, and who are required:

- (a) for service in the United Kingdom for defence against actual or apprehended attack, and
- (b) after mobilisation, for service at home or overseas.

The bulk of the men in the Army Emergency Reserve belong to A.E.R. units but a proportion of them are held in "pools", the object of which is

\* To be strictly accurate, this article deals only with category II of the A.E.R. This is by far the biggest portion of the A.E.R.

to provide reinforcements of specialists and key men to both the Regular and Territorial Armies.

Generally speaking, these Army Emergency Reserve units are of a technical nature, and, thus, a high proportion of the men in them are tradesmen who are employed in civil life in the same trade that they will pursue in the Army.

In the Army Emergency Reserve again we find volunteers forming the framework of each unit and part-time National Servicemen providing the bulk strength.

The fundamental difference between an Army Emergency Reserve unit and a Territorial one is that the former is not organised on a local basis. The Army Emergency Reserve unit draws its men from anywhere in the country, thus assisting it to obtain its required complement of specialists and to absorb those National Servicemen who do not live within the orbit of a Territorial Unit.

The decentralised nature of the Army Emergency Reserve therefore is complementary to that of the Territorial Army and is better designed to meet the needs of technical units. It produces, however, difficulties. Men in these units can only come together once a year at annual camp. Therefore, it is not easy to foster the unit spirit and impossible to train continuously throughout the year.

#### *Comparative Summary*

It may here be appropriate to sum up the characteristics of the two component parts of the Reserve Army.

The Territorial Army and the Army Emergency Reserve units are *similar* in that both:

- (a) have to be at the same state of readiness;
- (b) consist of civilian members of the community who carry out some military training each year and who have a liability for overseas service after an emergency has been declared by proclamation;
- (c) are based on a Cadre of long service volunteers;
- (d) are built up by National Servicemen doing the part-time element of their national service liability.

They *differ* in that:

- (a) Territorial Army units belong, in the main, to the "teeth arms" whilst Army Emergency units are chiefly technical or administrative;
- (b) the Army Emergency Reserve unit draws its men from anywhere in the country whilst the Territorial Army unit only takes local ones;
- (c) the Territorial Army unit has a permanent "home" in its Territorial Army Centre where its members can meet throughout the year. The Army Emergency Reserve unit only forms up as such once a year at annual camp;
- (d) training in the Territorial Army is continuous whilst in the Army Emergency Reserve it is limited to annual camp.

#### TYPES IN THE RESERVE ARMY

The Active Army has in its ranks two types of man—the Regular and the National Serviceman—but both are, for the time-being, whole-time soldiers.

The Reserve Army, on the other hand, has to deal with four types. To understand its structure, it is well to be clear as to the role and nature of each.

### *Permanent Staff*

Each Territorial Army unit has a very small permanent staff—whole-time officers and men if the Regular Army—to carry on the day-to-day administration of the unit and to act as advisers and key instructors.

Although an Army Emergency unit may, at camp, have some regulars attached to it, its day-to-day administration is carried out by a "Head-quarters, Army Emergency Reserve," staffed entirely by regular officers and men.

### *Volunteers*

Despite the presence of these professional soldiers of the Permanent Staff, the key-stone of the Reserve Army is to be found in the long-term Territorial or Army Emergency Reserve Volunteer. The importance of this element cannot be over-emphasised and without a proper appreciation of the position and role of these volunteers one cannot understand the Territorial Army or the Army Emergency Reserve.

Both the Territorial Army and the Army Emergency Reserve have been organised on the estimated availability of volunteers—geographically in the case of the Territorial Army.

The volunteers are civilians, mostly busy men, who have undertaken not only to serve their country as soldiers in war but also to lead, train, and administer reserve units in peace. There are to-day some 67,000 volunteers in the Territorial Army and 9,500 in the Army Emergency Reserve, 75–80 per cent of whom served in the 1939–45 War.

The former Territorial Army and Supplementary Reserve, of course, consisted exclusively of such volunteers. Their value in the event of war was proven in 1914 and 1939. But the volunteer of to-day is of even greater importance since, to him, has been entrusted the morale, training, and administration of the National Serviceman during the second part of his national service liability. No one will under-estimate the value of the National Serviceman in Britain's armed forces but it would be a complete fallacy to imagine that the Reserve Army could be composed exclusively of National Servicemen, all of whom are young men. From the aspects of leadership and training alone, it is essential to have men with far more experience and greater balance than can be attained during a man's compulsory service. Any such suggestion, moreover, ignores that essential volunteer spirit which makes the units of the Reserve Army the type that win battles.

Since this hard core of volunteers is indispensable in every Territorial Army or Army Emergency Reserve unit, its maintenance—its future availability—is a matter of the greatest importance.

It is intended, and indeed essential, that the volunteer of the future should come from amongst the National Servicemen themselves. Not only do these men constitute the majority of the available man-power but they will have two years' experience as soldiers behind them. It has been seen that to become a volunteer in the Territorial Army and to fulfil the

volunteer obligation, a man should live within a certain area—this may be described as the “normal recruiting area” of the unit. It will be governed by such things as “the last bus home” and the local habits of gravitating towards one market town or shopping centre rather than another. The Territorial Army volunteer areas were determined partly by plotting the address of every existing volunteer on maps, and partly by a study of local habits and time-tables. A calculation was then made of the available National Service man-power in each of these areas and the Territorial Army order of battle was adjusted to it in such a way that every unit and Sub-unit could count on an adequate slice of National Servicemen. This slice varies in size to some extent with the role of the unit and to a lesser extent with other factors, such as the fact that some areas have traditionally had a consistently high recruiting rate, dating back through various stages of the Territorial Army and Territorial Force to the old “Volunteers”.

Needless to say men do not grow up in towns in convenient multiples or fractions of a unit's war establishment. Thus no Territorial Army unit can be exactly at the right strength—some will be a little over strength and others under. A great deal of adjustment is necessary between individual platoons and companies.

In the Army Emergency Reserve the difficulty is not so great. Since its volunteers come from the whole country, it is feasible to build up an Army Emergency unit to exactly the right size before starting to post men to the next unit.

Before leaving the subject of the volunteer, mention must be made of two parts of the Territorial Army which contains Volunteers only—the units in Northern Ireland (where National Service does not pertain) and those of the Women's Royal Army Corps.

### *National Servicemen in the Reserve Army*

As has already been explained, all National Servicemen have to serve for 3½ years in the Reserve Army to complete their full National Service liability. In the preceding paragraph it has been shown that such National Servicemen should be regarded primarily as potential volunteers and not merely as reinforcements.

Not all, however, will be willing or able to become volunteers and not all will be suitable. Nevertheless, they are part of their Reserve Army Unit and will serve alongside their volunteer comrades in war. It is vital therefore that they should be accepted into their units as part of them and not as mere attachments.

Despite the fact that every effort is made to call up the bulk of the men living in an area into an arm of the service which is represented locally in the Territorial Army, not all National Servicemen will find themselves in the same arm in the Reserve Army as they were during their whole-time service. Some arms are not represented at all in the Reserve Army. Others have a surplus which must go to other arms. Others again have a much larger contingent in the Reserve Army than can be catered for by the regular units of that Corps. Thus, some “re-badging” on transfer to the Reserve Army is inevitable.

### *Z Reservists*

We now turn to the fourth, and last category of man to be found in the Reserve Army—the Z Reservist.

All those who served in the 1939–45 War are still liable to be called back to the forces in the event of an emergency. These men, in the case of the Army form the Z reserve.

To make good deficiencies in the Territorial Army (especially in certain key posts or trades which the young National Serviceman cannot fill) recourse is had to the Z reservists who are pre-posted on paper in peace and are available to join their units on mobilisation. Normally, these reservists do no training in peace but in 1951 and again in 1952 some Territorial Army and Army Emergency Reserve units were made up to full strength by their Z reservists for their annual camp.

### *Women's Royal Army Corps (T.A.)*

No reference to the Reserve Army would be complete without mention of the Women's Royal Army Corps of the Territorial Army. There is, to-day, an exceptionally wide range of duties for which women can volunteer and in which they can relieve men for a more active role. Thus we find women enrolling as radar operators and instrument numbers in anti-aircraft mixed batteries, drivers of mechanical transport, cipher personnel, teleprinter and switch-board operators, ammunition examiners, electricians, draughtswomen, clerks of all types, cooks, storewomen, and orderlies.

Following war-time precedent and the example of the other services, the Territorial Army raised its own women's sections, on an entirely voluntary basis, in 1949.

The value of these volunteers, in Anti-Aircraft Command in particular, is borne out by the number of vacancies allotted to them in "Mixed Units". These, as their name implies, contain both men and women. Vacancies for other volunteers are to be found in Home Command units, composed entirely of women.

The Territorial Army would welcome more members of the Women's Royal Army Corps. Indeed it has vacancies in its ranks for three times the present number of volunteers. In order to improve recruiting, the Women's Royal Army Corps units in Home Commands have been completely re-organised this year and already there are signs that more volunteers are coming forward.

## SHAPE AND SIZE OF RESERVE ARMY

Although the final planned strength of the Reserve Army must remain hidden in the mists of Security, its ultimate shape has already been announced.

### *Shape*

The Territorial Army will consist of some twelve divisions and five Anti-Aircraft Groups. All these formations exist already. They have been formed, complete with all their headquarters and units, and they

are building up month by month as more National Servicemen are drafted into them.

The order of battle of the Army Emergency Reserve will include some 1,200 units ranging from Light Aid Detachments of only 16 men to Vehicle Battalions R.A.O.C. amounting to 1,500 men. Here a shortage of volunteers has led to slower progress. Without that essential cadre of volunteers, it is not feasible to form a unit, no matter how many National Servicemen are available. Nevertheless, some two-thirds of this large number of units have been raised and more are springing up each month as volunteers come forward.

### *Strengths*

The over-all strength of the Reserve Army to-day is 297,000 but, as has already been shown, its true strength must be related to its volunteer content. We have already seen that at present there are 67,000 volunteers in the Territorial Army and 9,500 in the Army Emergency Reserve.

What of the future? The answer lies in the hands of the National Servicemen. 135,000 of these have so far been drafted into the Territorial Army and 86,000 into the Army Emergency Reserve. How many of these, at the end of their compulsory part-time service, will take on the responsibilities, extra liabilities, and long service commitment of the "direct" volunteer, and thus build up that vital cadre of volunteer leaders and instructors?

No one can yet answer that question because the first generation of National Servicemen has still to complete its compulsory service. Nevertheless, the portents are not unpropitious. National Servicemen, serving compulsorily in the Reserve Army, are encouraged to become "National Service Volunteers" during their part-time service. Those that do, accept the extra liabilities of the "direct" volunteer but, more important still, they become more a part of their unit. Regimental traditions and esprit de corps, comradeships and the old "Volunteer", county, or corps spirit begin to weave their spells. With their assistance, the good unit should have no need for recruiting sergeants.

So far some 28 per cent of the National Service Officers and 29 per cent of men who have been posted to the Territorial Army have become National Service volunteers. It would be wrong as yet to look upon these National Service volunteers as a numerical asset since, volunteers or not, they would still have to be in the Reserve Army. But that they are a real asset and an augury for the future well-being of that Army no one can doubt. All will depend on how many of them decide to become "direct" volunteers when their National Service liabilities are finished. We have no experience, no precedent upon which to base an estimate but, in 1954, the answer will start to appear.

## TRAINING

### *The Aim*

It may be as well to follow the well worn but nevertheless valuable military cliché and to ask oneself the object of training in the Territorial Army. This has been clearly stated as "to weld officers and men, most of whom are already comparatively well trained and experienced, into efficient sub-units, units, and formations. These units and formations



must be capable of reaching a high state of readiness for war soon after mobilisation".

Much the same can be said for the Army Emergency Reserve although, in this case, the accent is on unit training.

In attempting to achieve this aim, time (as ever) is the chief limiting factor.

### *Training Liability*

As we have seen, the main training liability for the Reserve Army as a whole, for volunteer and National Servicemen alike, consists of a fifteen days' camp each year.

In the case of the Army Emergency Reserve this is normally the sum total of their annual training, although some may volunteer to attend a course or some other form of training.

The Territorial volunteer, in addition to his annual camp, undertakes to complete a minimum of thirty "drills" (each of one hour) each year, although the great majority of them do much more than that number. A steady 100 drills a year or more is quite usual for most men in good units.

The National Servicemen in the Territorial Army, besides attending his fifteen days' camp, has compulsorily to complete a further fifteen days' training during his 3½ years' part-time service. Normally, therefore, he does five days each year in the form of twenty "drills".

### *Method*

Generally, training in the Territorial Army comes under one of the following main headings:

- (a) "In camp" training, i.e. the fifteen days' camp;
- (b) "Out-of-camp" training, which may be broadly divided into:
  - (i) evening training at the Territorial Army "centre" which is colloquially called a "drill night" from the days, unlike the present, when most training consisted of drilling.
  - (ii) Week-end training, or "week-end camps," normally performed at a week-end training centre (W.E.T.C.) or on the firing range.
  - (iii) Occasional courses of instruction.

It will be appropriate here to expand briefly on these week-end training centres. They are an innovation since the last war. Gradually, the focus of out-of-camp training in the Territorial Army has shifted from the Territorial Army drill hall or "centre" to the week-end camp. One of the chief reasons for this change is that the great majority of the men in the Territorial Army to-day are already trained soldiers. Individual training is limited to re-badged men or "refresher" courses. The emphasis, therefore, is on team training.

Here the old drill-hall system was found wanting in two respects. First, in nine cases out of ten, it offered no opportunity for training out-of-doors on the ground. Secondly, it increased the difficulty of marrying up instructors and men and, particularly, all the men of a given team. What was required was a system whereby not only were all the necessary volunteers present at a given time but the National Servicemen also.

This object is more easily achieved by selecting, well in advance, a given week-end and then appointing it as one of the compulsory out-of-camp training periods for the National Servicemen.

### *Annual Camp*

To the Reserve Army as a whole, Annual Camp is the highlight of the year. It is normally in the case of the Territorial Army and virtually in the case of the Army Emergency Reserve the only time when the whole unit comes together. It is then that something is seen of other units and most of the interesting training is done. It provides an annual change of scene for men who normally work year after year in the same town.

To the old Territorial, July or August represented the "camp months". But to-day circumstances have changed. The advent of mechanical and, particularly, tracked transport; the increased range and velocity of modern weapons which results in larger danger areas; and the public disinclination to make areas available, have all tended to restrict the number of suitable camps from which to choose. Thus the camp season has now to be spread throughout the summer—indeed, in the case of the Army Emergency Reserve, on into the winter. In an army which is dependent on its volunteers, this extension of the recognised period for annual training has affected not only the members of the Reserve Army but their employers as well. Seasonal occupations and traditional holiday periods in many industries make it difficult for certain units to go to camp at any season and sometimes confine them virtually to one period only. A further complication arises when the period suitable for one company or battery of a unit from one town does not suit the sub-unit in the next. Only by an intimate knowledge of local habits, by planning months in advance and by the co-operation of soldier and civilian alike can the full camp programme be arranged.

As far as is practicable, training at annual camp is organised on the basis of a three year cycle. Thus, in the first year, a unit concentrates upon sub-unit and unit training. In the second, unit training is followed by brigade training and, in the third, by divisional exercises.

### *Remuneration for Training*

For all training periods which consist of at least eight hours' attendance, members of the Reserve Army receive the full Regular Army pay and allowances of their rank.

In the case of the Territorial's out-of-camp training for periods of from two to eight hours, remuneration is effected by means of a "Training Expenses Allowance". This allowance is designed to cover any incidental expenses during evening training periods.

All volunteer other ranks in the Territorial Army can earn a bounty which is issued without prejudice to any other emoluments or pay. The payment of the full bounty is dependent upon the satisfactory completion of all the conditions attached to it. Thus, a direct volunteer can earn a bounty of £12 per annum and a National Service volunteer a modified one of £9. Similarly, the direct volunteer in the Army Emergency Reserve can acquire a full bounty of from £9 to £19 depending on the different obligations pertaining to the varying categories in this reserve.

It will be noted that no bounties are paid to officers nor to National Service volunteers in the Army Emergency Reserve.

### EQUIPMENT

Gone are the days when the Territorial Army might, as regards equipment, look upon itself as the Cinderella of the forces. The Reserve Army of to-day has, in practically every way, the same weapons, vehicles and equipment as the Regular Army. Moreover, as new items are produced, the Reserve Army is not forgotten and it receives its quota in the shape of a training allotment. Thus it can justifiably boast that it is fully up to date in this respect.

This does not necessarily mean that all Territorial Army units are equipped in peace to the same scale as their regular counterparts. They hold in their Territorial Army centres all that is necessary for their out-of-camp training. To complete them to full scale would, of course, only lead to unnecessary accommodation and maintenance problems. When the time comes for annual camp, units are given additional equipment to meet their increased requirements.

Thus, to-day, members of the Reserve Army know that they are training not with obsolete equipment but with the actual items which they would take with them to war.

### ADMINISTRATION

Having dealt at some length with the organisation and training of the Reserve Army, it may now be appropriate to consider how it is administered.

The administration of a part-time army of this size is naturally a somewhat complex matter. This is particularly so in the case of the Territorial Army which, as we have seen, is dispersed over the whole Kingdom, functions throughout the year, and relies largely on volunteers for much of its administration. Since the Army Emergency Reserve virtually only "comes to life" for two weeks in each year, its problem is met by a simpler solution.

#### *Administration of the Territorial Army*

Broadly speaking, the Territorial Army is administered in peace through a double chain of command. First, we find what might be termed the "normal military chain" which, starting from the War Office, passes through the headquarters of Home Commands down to District headquarters and the headquarters of Territorial Army brigades. These District headquarters, in most cases, have a dual role—they are the headquarters of the local Territorial Army division as well as of a Military District. In Anti-Aircraft Command we find A.A. Group H.Q. taking the place of District H.Q. but in their case, the Commander has no "district" responsibilities. District headquarters are staffed almost entirely by officers of the Regular Army, while Territorial Army brigade headquarters have a skeleton staff of regulars. Both types, however, can be completed to establishment by Territorials. This military chain is responsible in the main for training but it also deals with certain personnel matters and for administration at annual and week-end camps.

The second chain introduces us to that integral part of the Territorial Army, the Territorial and Auxiliary Forces Associations.\* These bodies, dating back to the founding of the Territorial Army in 1908, are an essential part of the Territorial organisation. They shoulder much of the local work involving local knowledge which would otherwise have to be covered almost exclusively by the Territorial officers in the units. Such work is patently right outside the scope of a purely regular organisation in which the Commanders and Staff will be frequently changed.

There is a Territorial and Auxiliary Forces Association in all but the smallest counties. Each has its own "scheme" or charter. Its president is the Lord Lieutenant of the County and its Chairman and Vice Chairman are elected from amongst the members of the Association. Its membership covers a wide field—military, Air Force, Cadets, Home Guard, local government, educational, employers, and employees—but each scheme ensures that the military interests are not swamped by the civil.

The role of these Associations can be summarised as the administration of Territorial units in their Territorial Army "Centres", payment for "drills", responsibility for clothing, recruiting, and, in fact, almost all *local* matters. Perhaps the most important general function of an Association is to maintain contact with all local bodies, such as County Councils, Education Authorities, Employers, and Trades Unions. In the New Model Territorial Army, with the inclusion of National Servicemen in its ranks, this responsibility alone renders the Associations invaluable and discounts the criticism that they are an anachronism.

This dual system of having Territorial and Auxiliary Forces Associations, as well as the normal military chain of commands does, of course, lead on occasion to complications. In practice, however, these are more fancied than real. It is simple to suggest that the military chain could undertake all the work of the Associations, but such a suggestion ignores the fact that regular officers move frequently to fresh appointments, and that in an army raised on a geographical basis there must necessarily be a large number of civil rather than military problems and contacts. It is as well to remember that the Territorial Army is a volunteer organisation and cannot exist entirely on decrees from Whitehall. It could not exist at all but for whole-hearted local co-operation, which the Territorial and Auxiliary Forces Association is designed to foster.

#### *Administration of the Army Emergency Reserve*

As has already been said, the administration of the Army Emergency Reserve is a simpler matter. The organisation of this reserve differs from that of the Regular and the Territorial Armies in two fundamental ways:

*First:* units of the Army Emergency Reserve exist as such only for a fortnight in each year: For the rest of the year, they do no unit training, and have no official life and cannot administer themselves.

*Secondly:* there are no formation headquarters to form a command link between the War Office, Home Commands, and the units.

It would be an error, however, to imagine that the administrative measures

\* The reasons why Associations are both "Army" and "Air Force" are not dealt with in detail here, but the main one is the prevention of cut-throat competition for part-time soldiers and airmen in the same place and to avoid expensive duplication of staffs.

for these units can, like their training, be confined to two weeks in the year. National Servicemen are drafted into the Army Emergency Reserve every fortnight throughout the year and these have to be received and the necessary documentation completed. Volunteers have to be obtained and enrolled; and preparations have to be made for units' annual training, including the issue of notices to all reservists.

It is apparent therefore that some form of permanent headquarters is necessary to fill the gaps inherent in the Reserve's organisation, to perform the day-to-day administration, and to give cohesion and continuity to it.

This need has been met by the provision of "Headquarters, Army Emergency Reserve". There is at least one of these headquarters for each Arm or Service, each of which consists of a Commander and a small staff, which is divided into a Documentation Wing and a Training Wing. The size of these headquarters is based on the numbers of reservists in the particular arm but they are staffed entirely by regular officers and men.

#### STATE OF READINESS

"To what," it may be asked, "does all this amount? How quickly could this new model Reserve Army take the field."

Since the answer to that question would be of considerable value to any potential enemy, it is obvious that it cannot be given.

However, no national reserve, composed as it will be of men following their normal callings in civil life, can be ready immediately for battle. A nation can have trained men ready to spring to arms. It can set aside the arms and equipment for them. Thus far it can go and thus far, it will be seen, Britain has gone. But even the best trained and equipped soldiers do not necessarily make an effective army. Men must be welded into units and units into fighting machines which are part of higher formations. Only when this has been achieved is an army ready for battle, and this means collective training. More particularly, it means time.

It is patent that two weeks' collective training each year is too short a period to keep the brigades and divisions of the Reserve Army at a minute's notice to take the field. Some will suggest an increase in the annual period of training. Others may wish to go further and have partial mobilisation. But such ideas ignore the basic structure of this Reserve Army. For its leaders and trainers, it is almost entirely dependent upon volunteers. Such a voluntary system requires the co-operation, in a greater or less degree, of everyone in the country. To introduce measures which are militarily desirable may be tempting, but if they are unacceptable or even very unpopular to the public or civil authorities, the loss they would cause to the Reserve Army would be infinitely greater than the gain. We are therefore forced to accept the limitations inherent in any voluntary system.

Nevertheless, it can be said that the state of readiness of the Reserve Army to-day is greatly superior to that of 1939:

First, by having in existence in peace virtually all the units required at the opening of a hot war.

Secondly, by ensuring that all these units train in peace.

Thirdly, by giving the majority of the men in the Reserve Army a thorough grounding by whole-time service in the Active Army before they join the Reserve Army.

## THE HOME GUARD

Since the main object of the Reserve Army is to have a force available to go overseas quickly in the event of a hot war, it follows that Britain must have some form of reserve to defend the home country. Moreover, on the outbreak of war (or even in the emergency period which may precede it) there will be an immediate requirement for armed men for local guard duties. In these days of airborne forces, communications, vital installations, and aerodromes all call for ground forces for their local defence. These tasks, in the absence of any other force, would inevitably fall to those Territorial Army formations or units which were waiting to go overseas. They would have to be dispersed over the length and breadth of the country, thereby losing their potency as a mobile reserve to deal with any major threat.

To meet this need, the Home Guard was re-born in 1952.

The roles of this force are defence against airborne and small sea-borne raids, the protection of key points, assistance to the Civil Defence Services, and, in the last resort, against invasion.

The Home Guard, which is part of the Armed Forces of the Crown, is essentially a local defence force. Service in it is entirely voluntary, spare time, and unpaid, although out of pocket expenses are naturally met.

The plan, in peace, is to enrol some 90,000 of these volunteers into Home Guard Infantry battalions throughout the length and breadth of the land. There are two types of battalion—"effective" and "Cadre". Broadly speaking, "effective" battalions are located where there will be the most urgent need for them. These units have a peace strength of three hundred. They train in peace and are required for immediate action in an emergency. "Cadre" battalions, with a strength of one hundred, prepare and plan for their rapid expansion in war.

All Home Guard battalions have now been raised and they are gradually building up their Cadres of volunteers. Some 27,000 have been enrolled and training has started in "effective" battalions. Behind this planned peace-time nucleus of 90,000 stands the Home Guard Reserve. Men who volunteer for this do no training in peace but are earmarked for immediate enrolment in war when the Home Guard will expand to its full war strength.

This local defence force is armed with modern small arms—Brens, Stens, and rifles, and has been issued with uniforms and greatcoats. It is open to all reasonably fit men between the ages of 18 and 65 who have no active or reserve liability in one of the armed forces.

The chain of command for the Home Guard is very similar to that in operation for the Territorial Army. Thus we find Home Commands responsible, under the War Office, for its organisation, training, and operational role, whilst it is administered by the county Territorial and Auxiliary Forces Association.

## CONCLUSIONS

The great experiment, begun three years ago, of grafting Britain's first national service reserve on to the twentieth century descendants of the Elizabethan trained bands begins to bear fruit in the first year of our second Queen Elizabeth's reign.

To-day, behind the Regular Army stands a Reserve Army of close on 300,000 men, organised into field force formations and anti-aircraft groups. The build-up of this reserve force will continue until it reaches its full maturity in July, 1954. The vital backbone of this army is made up of those patriotic volunteers—lawyers and ploughmen; business executives and miners; shop-keepers, clerks, press-men, doctors, and drivers—who in times of trouble have always come cheerfully to their country's aid—men whom the late Chief of the Imperial General Staff so eloquently dubbed as "twice a citizen". The flesh is provided by the young National Service soldiers, fresh from two years' service in the Regular Army. To these the Reserve Army looks for its future.

Behind this Reserve Army in turn stands the Home Guard, the presence of which in an emergency will free those parts of the Reserve Army destined for immediate service overseas, and which will prevent the rest of it from being deployed all over the country on guard duties.

This is a far greater Reserve Army than Britain has ever possessed before. It is the outcome of the modern strategic and tactical developments which have led to the overwhelming increase in the pace at which we in this country can afford to put our Army on to a war footing. It is no swashbuckling, sabre-rattling force designed for aggression, but a practical manifestation of the Englishman's determination to uphold his way of life by the prevention of war.

"NEIL ANSER"

## CHAPTER XXIV

### PROBLEMS OF MANPOWER IN THE ARMY

BY MAJOR-GENERAL E. H. W. COBB

IN SPITE of the ever increasing power of modern weapons, the Army of to-day is no less dependent on manpower than it has been in the past. The cold war has emphasised and indeed accentuated this dependence. You cannot use atom bombs against Malayan guerillas, while the first requirement in the struggle against Mau Mau has proved to be more Infantry. Everywhere the demand is for more and still more men for the Active Army, particularly fighting men, and the provision of adequate manpower of the right quality within the framework of the country's already over-stretched economy is a major problem facing the Army, and indeed the nation, to-day.

It is not within the province of this article to analyse in detail how these pressing demands for manpower have arisen, still less to attempt to justify them. The commitments are there, and are certainly not of the Army's choosing. The War Office is continuously on the alert for means of saving manpower. Its own establishment has been cut 10% in the last year, and numerous committees of investigation have combed the Army, scraping off a man here and there from establishments. But nobody has yet produced a practicable plan for reducing materially the numbers required to meet present commitments.

The purpose of this article is to examine the difficulties inherent in meeting the requirement, how they have arisen, and what is being done to meet them. It would not however be complete without some reference to the second major problem in the manpower field, namely the organisation of adequate reserves of trained men so that if hot war comes, general mobilisation can be carried out with a smoothness and rapidity far greater than has ever been achieved in the past. It would be impracticable within the compass of a single article to cover both subjects in full, and in any case information on mobilisation planning is necessarily severely restricted by considerations of security. For these reasons it will be found that the problems of the Active Army occupy the lion's share of the available space. The reader should not infer therefrom that the problems of the Reserves are any less complicated, nor that they are being treated with any less degree of urgency.

#### THE ACTIVE ARMY

##### *Expansion since 1950*

The present strength of the Active Army, which includes regulars serving with the colours together with National Servicemen doing their whole time service, stands at nearly 435,000 all ranks, excluding women and enlisted boys, a figure well over double what it was in 1938. It has been expanded by nearly 90,000 men in the last 3½ years, by a process which was very rapid in late 1950 and in 1951, when the pressure of the cold war began to be felt in earnest, but which slowed down in 1952.

While there are now unmistakable signs of the approach of a financial



blizzard, lack of money has not yet proved a primary factor in restricting expansion, which has been arrested almost wholly by limitations of availability of manpower. This may seem odd in view of the present greatly improved rate of regular recruiting, and to understand this apparent paradox it is necessary to go back a little and examine the means by which the 1950-52 expansion was brought about.

In the summer of 1950 the Army was running down fast from its war-time strength of nearly 3 million towards a target of about 320,000 which was to include some 100,000 National Servicemen doing one year's whole time service. This total had been calculated as the minimum strength needed to carry out the normal peace-time functions of imperial policing, including an "occupation" force on the continent of Europe, and to provide the basic framework upon which to expand in war. The target was a low one in prevailing conditions, among which must be stressed the fact that we no longer had at our disposal the Indian Army, and it was governed in large measure by the prospect of a seriously dwindling defence budget. There was too the inevitable post-war reaction, that war could never come again. In the unhappy event of it ever doing so, reliance was to be placed on reserves which were to build up in the form of National Servicemen doing part time service. To reach this low target had meant some ruthless pruning and streamlining of the Army's peace-time order of battle. It had meant among other things, the disbandment of all second battalions of line regiments and the relegation of a number of first battalions and some historic cavalry regiments to the role of basic training units in the U.K.

By August 1950 the strength had fallen to a little over 350,000 and the Korea crisis found us in a deplorably weak condition, particularly in fighting units, so that within existing resources we were actually unable to despatch a full brigade group to the Far East. Instead of contracting further as planned, the Army had suddenly to expand, and to expand with great rapidity. This reversal of previous plans was only achieved by the adoption of a series of special measures. To understand the present manpower position it is necessary to examine in some detail what these measures were.

#### *Means by which expansion was achieved*

First, it was decided to recall to the colours about 4,500 regular reservists, specifically for employment in Korea. This measure, terrible in time of so-called peace, produced an immediate dividend of trained soldiers, many of them NCOs. But it was inevitably of a temporary nature and all reservists were released by March 1952.

Secondly, the release of regulars reaching the end of the colour service part of their engagement was suspended. This measure, known as the "Freeze," had in equity to be applied once it had been decided to recall the reservists. It was in any event vital since, without it, we could not have achieved the rate of expansion required, nor could we have provided in any other way the requisite number of NCOs (and to a lesser extent of officers) essential to make practicable the third measure which will be described below. Like the recall of reservists it was undertaken, nevertheless, with very great reluctance. The gain from this source amounted numerically to about 35,000 all ranks at January, 1952, by which time the

maximum period of retention had reached 17 months. Thereafter, release was progressively re-opened, and the period of retention was gradually reduced. It will be eliminated entirely by September this year. As with the reservists the long term dividend is therefore nil and, worse than that, there is little doubt that this necessary but unfortunate measure had a disturbing effect on the contentment of the regular element of the Army, which in turn has depressed the rates at which regulars are signing on for further periods of colour service. It is not easy to say how long this effect will persist, but the "Freeze" will not quickly be forgotten.

The third measure, taken in August 1950, was the decision to extend the period of whole time National Service from 18 months to 2 years. This provided, by the end of 6 months, a gain in strength of over 50,000 men from which the Army still benefits. It has meant an equivalent loss to the Reserve Army, a visible sign of the change of emphasis resulting from the intensification of the cold war. The needs of mobilisation should hot war come are no less urgent, but there is increasing realisation that first priority must be to "win" the cold war.

### *Improvement in the Order of Battle*

Simultaneously with the expansion of the active Army's strength, a rigorous comb-out of all establishments, particularly of the administrative services, was initiated. The extra numbers made available by the measures described, and to a lesser degree by this internal re-organisation, enabled the Army's fighting strength to be augmented by one infantry and two armoured divisions, while at the same time a substantial contribution was made towards the formation of the Commonwealth division in Korea. In the process, the several regiments of the Royal Armoured Corps and Infantry of the Line, previously reduced to training establishments, were re-activated so as once again to take their rightful place as properly constituted fighting units. Nevertheless the requirement still outstripped the available supply of such units and it was decided early in 1952 that a further seven infantry battalions should be formed during that year.

### *Position in early 1952*

It will be realised that the peak of the expansion resulting from the measures taken in 1950 was reached in the early months of 1952. The recalled reservists were then returned to civil life, and a start was made with the release of regulars who had been compulsorily retained. New men had to be found during 1952, not only to compensate the normal run-out of National Service men, but also to replace the released reservists and regulars and at the same time to provide the further expansion of strength needed to form the additional infantry battalions.

### *Effect of improved pay*

The introduction of the new pay code in September, 1950, had given a much needed boost to regular recruiting. It proved, however, to be a flash in the pan, and by mid-1951 it became all too clear that recruitment was rapidly falling away to its earlier deplorably low level. In any event regular recruits are in the main drawn from the same source as the National

Service entry, so that an increase in voluntary recruiting automatically reduces the numbers available for compulsory call-up. It follows, therefore, that no increase in total strength results from improved recruitment until two years after the improvement begins, because during that period the Army would in any case have the men as conscripts. The improvement in recruiting noted in late 1950 and early 1951 could not therefore be reflected in the Army's overall strength until 1953, and was in any case insufficient. The additional numbers required in 1952 could, in short, be found only if by some means the National Service entry to the Army could be substantially increased. This meant that the overall pool available for call-up in 1952 had somehow to be augmented.

#### *Increase in the numbers called-up*

Fortunately, in the normal working of the National Service Act, the age of call-up had been gradually rising above the statutory minimum of 18 years, and by 1952 men were not being called up, except in special cases, until they had reached at least 18 years 3 months. By reducing the age to 18 years, it was possible to draw a considerable number of additional men into the call-up pool. The Army's share was raised from the previous year's figure of about 120,000 to nearly 160,000 without materially affecting the normal allocations to the other two services.

Numerically the Army's problem was solved, or more precisely it was postponed for two years, because at the end of that time the extra men would finish their whole-time service and leave the colours. The same problem would therefore arise again during 1954, but the same solution could not be applied again in that year, since it is not feasible to lower the call-up age below 18. These facts were fully realised at the time, and since there were no grounds for believing that a substantial fall in strength would be any more acceptable in 1954 than in 1952, means were sought to meet the situation which would inevitably arise in the later year. No improvement in the size of the pools available annually for call-up was foreseen until 1960, when the efforts of the sudden improvement in the birth rate recorded in 1942 will be felt. The Army could not therefore count again in 1954, as in 1952, on receiving much increased numbers from the call-up, although in the event a marginal increase from this source may be possible because the requirements of the RAF over the next few years may be less than previously expected. It had however been realised, as soon as expansion began in 1950, that the only satisfactory long term solution to the problem of maintaining an improved total strength lay in a substantial increase in the regular element. The problem was how to achieve this. The need for better recruiting had indeed long been recognised, but it was the pressure of events in and after 1950 that finally forced action to be taken.

#### *Measures to improve Recruiting*

Mention has already been made of the improvement which followed the long overdue increase in pay granted in September, 1950. This improvement was however short lived, and it was clear that some fundamental change of approach was required if the flow of new recruits which the Army so badly needed was to be obtained. The decision was therefore taken in 1951 to scrap all the existing engagements, and to introduce an

entirely new system designed to "liberalise" the Army, bringing it more closely into line with civilian practice and current political thinking. Men were henceforth to be offered a choice of a short engagement of 3 years (followed by 4 years on the reserve), or a career engagement (leading up to a pension at 22 years) which they had the right to terminate at 3 year intervals on giving six months' notice. Independently of the new engagements, the Army Council laid down as a matter of policy that every opportunity would be given to men who wished to do so, to carry on in the Service beyond 22 years, up to the age of 55 years, subject only to medical fitness and efficiency. Here was an immense change from the past, the full consequences of which on the Army are even now but dimly grasped. Bearing in mind the steady deterioration in recruiting since 1945, which even improved pay had done so little to stop, it is probable that nothing but an approach on these lines could have hoped for success. It was indeed in the spirit of the times, but it remains to be seen how efficient an army can be built up upon such terms.

### *Effect of the new regular engagements*

The result on the recruiting figures was electrifying. Over 50,000 men enlisted on regular engagements in 1952—an all-time record and well over double the average of earlier years. It has, however, been explained earlier in this article that an increase in the regular entry produces no corresponding increase in total strength until 2 years later. The effect of the higher regular entry achieved in 1952 will therefore be first felt in 1954, and, taking account of the probable size of the Army's allocation from the National Service pool, it is estimated that the fall in strength in that year can as a result be limited to about 15,000 men. To that extent the new recruiting policy has been successful.

It will not have escaped notice, however, that by the end of 1954, men on the new engagements will begin to reach the end of their first three years, and from then on a substantial proportion must be expected to leave the colours each year. During 1955 and 1956 moreover, men who enlisted in 1950 and 1951 on the old engagements of 5 years will also be leaving the colours in considerable numbers. The combined run-out will certainly exceed, probably by a substantial margin, even the most optimistic forecast of the total regular entry in those years. In these circumstances, the regular strength will inevitably drop after 1954 and the total strength will drop with it, unless the Army can draw in more men from the call-up in compensation. Its ability to do this depends on the requirements of the other two services which are unpredictable at the present time.

### *The Recruiting Paradox*

It will probably be surprising to many readers to be told that the great increase in recruiting which began in 1952 is not materially improving the Army's strength. The increase, however, was a great deal more apparent than real. A true comparison can only be made if account is taken, not only of the increased numbers enlisting, but also of the reduced period of service for which they now enlist. It will be readily understood that an annual entry of 50,000 regulars, serving for 3 years each, will in the long run produce no greater serving regular strength than an entry of 25,000, serving for 6 years. The true measure of recruiting is not solely

numbers of men enlisted, but rather the product of men multiplied by years. This is a most important principle, which is not always fully understood. When applied to the present case, it will be found that whereas the *numbers* recruited in 1952 were considerably over double the previous year's total, the *man-years* recruited were only about 15% higher. There are clear indications that the recruiting figures for 1953 will be lower than in 1952 so that during the current year even this modest improvement in real recruiting may disappear. This is an alarming prospect, because it can only mean that, if matters continue as they are, the regular strength in the long run cannot be maintained much, if at all, above the average level of the past, even though the Army continues to attract at least 20,000 more men every year than it was then able to do. Moreover since this additional regular intake can only come from the National Service age band, it must result in a smaller call-up intake and so to a decline in the National Service strength. In these circumstances it is difficult to avoid the conclusion that the strength of the Active Army will in the long run fall to 400,000 all ranks or less, even with National Service remaining at 2 years.

### *Need to maintain present strength*

Speculation as to how long the country will be willing, or indeed able, to support 2 years full-time compulsory service would be both profitless and out of place in this article. It is, however, abundantly clear that a fall in strength of the order suggested in the previous paragraph could not conceivably be accepted, unless a substantial cut in commitments was made at the same time, of which there is little sign at the moment of writing. In consequence the most urgent attention is being given to the problem of keeping up the future regular strength, whatever may be the ultimate decision on the period of full-time National Service.

### *Internal Recruiting*

It has already been noted that the basic problem of recruiting is to recruit *men-years* rather than men. Carrying this thought a step further, it will be seen that men-years can be recruited not only by bringing new men into the Army, but also by persuading those already serving to *stay beyond the end of their current engagement*. Thus a man serving on a 5 year engagement who can be persuaded to extend his colour service to twelve years brings in seven man-years. Similarly, a man on the new 3 year engagement who transfers to a nominal 22 year engagement at the end of his first three years thereby brings in, for certain, 3 additional man-years. If he does not exercise his option to leave the colours at the end of his next three years, he will bring in a further three man-years at that date and so on. Moreover this method of gaining man-years, which has come to be known by the generic term "internal recruiting", has two major advantages; it involves no training problem, and it involves no loss of National Service strength. It is therefore to internal recruiting that the Army is looking to overcome its difficulties.

The aim of internal recruiting may be expressed in another way. It is to raise the average period which a man serves with the colours above the basic minimum for which he engages as a recruit, which is now three years in all cases except for the relatively small "boy entry". Assuming an annual entry of about 45,000 men in future years, the regular strength

without any internal recruiting could not exceed about 135,000. If, however, we could raise the average "worth" of each regular recruit to five years, the same entry would yield a regular strength of 225,000 which would go a long way to solving the Army's manpower problem.

### *Extension Rates*

Unfortunately the attainment of this apparently modest aim is likely to prove a great deal more difficult than it would at first appear. Actuarial calculations, taking into account other factors such as the normal losses from deaths, discharges on medical grounds, and so on, show that its achievement requires at least one third of all regular recruits to serve for six years, one sixth for nine and one eighth for longer periods still. Until the first of the men on new engagements complete three years' service in November, 1954, there will be no direct evidence on which to assess extension rates applicable to such engagements, but our knowledge of the rates applying to-day to men on the old engagements gives no cause for complacency in this direction. Experience shows that, as a general rule, the longer the period for which a man has served, the more likely he is to wish to continue serving. Thus the average rate of extension at present prevailing for men on normal engagements is about 15% at 5 years and 30% at 7 years. Of the relatively very few men reaching 12 years, over 70% elect to stay on. These figures make it clear that to expect the men on the new engagements to extend at 3 years at a rate of 33½% may be optimistic. There are however two points on the credit side, which must be mentioned in this connection. First, the men will be committing themselves only for a further three years, as against seven at the 5 year point under the old terms. Secondly, there has been an encouraging response to the 22 year engagement, which is now attracting some 40% of the total entry. The difference is mainly psychological, in that, while the men concerned can still leave the colours at the end of their initial three years, they must take active steps if they wish to do so; they must so to speak "contract out", whereas in the past it has always been a case of "contracting in". On the debit side, however, there is no doubt that substantial numbers are taking 3 year regular engagements with no thought of an army career, but merely as an attractive alternative to 2 years' compulsory service. It remains to be seen what success can be achieved in converting such men to the idea of an army career or even to serve on for a further three years.

### *Factors affecting Extension Rates*

Obviously a major factor in doing so must be to ensure that a career in the Army compares favourably with what civil life has to offer, the more so at a time of full employment. Except possibly to the really highly skilled tradesman, whose skill commands a high premium in industry, there is little doubt that the Army does now offer to men of the right quality a career which, on paper, is fully competitive. There is an acute shortage of longer-service regulars, which itself ensures that promotion to non-commissioned and warrant officer rank is abnormally rapid, while the new system of engagements and the "career to 55" scheme should have removed any fears men may previously have felt of being suddenly left to fend for themselves in early middle-age. What then are the

obstacles to greatly improved rates of extension? The short answer is the "cold war". It is not the complete answer, but it is unquestionably the major factor. The bad taste left by the "Freeze" is another, and many men, particularly pre-war regulars, complain that the constant turnover of National Servicemen in units is upsetting. But over all looms the effect of the cold war, as a result of which the Army is being subjected to a strain unprecedented in peace time in the effort to meet its tremendous commitments throughout the world. An over-large proportion of its strength is overseas, often under active service conditions. Families are divided, with little prospect of being re-united. Individual and unit moves take place with alarming frequency and often with inadequate notice. The list of woes, some real, some imaginary, could be continued further, but they are already all too well known and perhaps exaggerated. Few of them would get a second mention in time of real war, but this is supposed to be a time of peace; fewer still have much direct bearing on the young unmarried soldier. But in the sum they add up to a general feeling of instability, especially in the minds of the older men, who are consequently disinclined to volunteer for further service. Such feelings tend to be contagious and all too easily communicated to the younger men. The result is that far too few of the all-important older men are staying on now, and a greater proportion of younger men will need to stay on in the future to replace them, and more still if numbers are to be built up again. The cold war is at one and the same time the prime cause of the need for more regulars and the major obstacle to retaining them. Failure to retain them puts an added strain on those remaining and the vicious circle is complete.

#### *Means of improving extension rates*

The War Office is grappling with the problem as a matter of urgency, and a good deal of progress has already been made. For example, the principle of three year overseas tours for regiments of the Royal Armoured Corps and for Infantry battalions has been accepted and, as far as the cold war will allow, is being implemented. It is enabling much greater stability to be imparted to the regular elements of the units concerned. Then again, special rates of local overseas allowance have been introduced for men separated from their families which, while in no way removing the fundamental cause of discontent, will at least go some way to removing the added insult of having to pay for it. But the weeds of discontent are uncommonly difficult to eradicate by any normal process of cultivation. Recourse must be made, if only temporarily, to the alternative of using a powerful artificial fertiliser to raise a crop so heavy and so healthy that the weeds are smothered. Such a fertiliser is already in use in the form of the "bounty" scheme under which men are paid, subject to certain conditions, lump sums of money when they extend to 12 years or re-engage for 22 years. The trouble is that it is not being used in large enough quantities, and it is questionable if it is even being put in the right parts of the field. The whole problem of bounties is now being studied afresh, with particular reference to their application to men on the new engagements, and it would be out of place to prejudge the outcome of this study. It can only be said at this stage that to obtain the results which are required, a substantially larger outlay of money is going to be needed.

*The Age Structure*

We have seen that the requirement of total strength demands an improvement in the present extension rates. There is however a second and even more urgent reason why they must be improved.

The Army at the present time is suffering from a growing shortage of NCOs, particularly sergeants and senior corporals. The reason is not far to seek. Since 1950, when expansion began, the proportion of men with *six (or more) years' service* has fallen from about 19% of the total other rank strength, at which level it was perhaps just satisfactory, to under 12% and it is still falling. (This division of the Army between the sheep and goats at the six-year line is of course quite arbitrary. The point at which a "young soldier" becomes a "potential senior NCO" obviously cannot be exactly fixed in time, but six years provides a convenient peg on which to hang our study of the age structure). There has been a huge influx of raw recruits, regular and conscript, but with the end of the "Freeze" there has inevitably been no corresponding increase in the longer service element. There is in consequence increasing difficulty in finding suitable men to fill the establishment of NCOs, with the result that some immature men have to be promoted. Unit efficiency suffers, while in some cases the young NCOs fail to make good and have to be broken; they then naturally take the next opportunity to quit the service, so that once again we are in a vicious circle.

The recent increase in recruiting cannot solve this problem in the short term, and it will only do so in the course of years if sufficient of the new recruits can be persuaded to stay at the end of three years and again at the end of six. There is therefore a most pressing need to improve extension rates of men on the old engagements now, and above all to ensure that from late 1954 onwards, when the new 3 year men have their first opportunity to leave the Army, a high proportion can be persuaded not to do so. Even if both these aims are achieved, it will be many years before the age structure can be restored to the old level of the pre-war Regular Army. Thanks to the virtual cessation of regular recruiting during the war and the low rate at which it ran from 1945 to 1951, the present "field" of young regulars is too small. A very substantial increase in the rate of extension would be required to stop the present decline, let alone effect any improvement. On the other hand, the increased regular entry from late 1951 onwards clearly will only begin to improve the numbers of men with over six years' service in late 1957. If the age structure is eventually to be restored, at least one man in every three on the new engagements must elect to stay on beyond the basic three years. This target is all important, because if it is not achieved, the field at subsequent points will never be large enough to meet the requirement. Even then one in two must go on at six years, and not less than three out of every four at nine years. It will be clear therefore that the effectiveness of the Army depends, to a very large degree, on finding a satisfactory solution to the problem of materially improving extension rates.

*Effect of varying extension rates*

There is a further aspect of the extension rate problem which merits examination. It is open to men on the old engagements, on reaching the



end of their current period of colour service, to transfer to the new type 22 year engagement, instead of extending or re-engaging in the normal way. A steadily increasing proportion is doing so and it will therefore not be many years before almost the whole of the regular element of the Army will be serving on the new engagements. Every regular will then have the opportunity of leaving the colours, if he wishes, once every three years, or, put it another way, one third of the entire other rank regular strength could disappear in a single year. Such an eventuality is hardly likely to arise in practice, but its mere possibility should leave no doubt in anybody's mind of the importance which must from now on be attached to achieving adequate extension rates. Moreover, since the annual field will in future be so large, a relatively small variation in the overall rate can have a most serious effect on the strength. Considerable variation can and does occur; for example, during 1952 the rate applicable to men on 5 year engagements was more than halved between January and June only to recover partially by December. Such changes are wholly unpredictable. But whereas in the past the effect on the strength over a year would not exceed two or at the most three thousand, under the new conditions the figure could quite easily be 10,000 or even more, and a loss of this size would be serious. The solution to this problem is not easy to see. Two possible approaches are being studied. The first, based on the bounty system, would aim to reduce the frequency of opportunity which the new engagements offer for leaving the colours. Under this proposal a man would be paid a substantial bounty in exchange for waiving his rights to opt out of the army from, say, three to twelve years. The second proposal, longer term in its operation, would increase the Army's entry of boys, and more especially "regimental" boys—that is, boys enlisted not for training in specific trades, but for training as potential regimental NCOs in their chosen arm or service. Since terms of engagement for boys still involve six or eight years' colour service from the age of 18 years, this proposal, like the first, would have the effect of increasing the Army's content of men committed to longer periods with the colours than the basic three years. It would incidentally have the added advantage of ultimately increasing the supply of good NCO material. Both proposals are eminently desirable in themselves as steps towards improving the overall age structure, but in the present context they may be regarded as forms of insurance against risks implicit in the new system of engagements. They would cost a good deal of money, but the risks are there, and it would be unwise to ignore them.

### *Officers*

Up to this point our study of the manpower position in the Army has been of a general nature and has dealt mainly with the situation as it affects the other ranks. We have seen that there is a growing deficiency in longer service men and that in consequence there is a shortage of non-commissioned officers. With this background, it is logical to proceed to an examination of certain other aspects of the manpower position.

It is a platitude that the efficiency of the Army as a whole is dependent on an adequate and contented corps of officers of the right quality. The NCOs and WOs are the backbone, but the officers are the head, without

which the body cannot function at all. The officer cadre is made up of Regular, Short Service, and National Service officers. The total does not fall very far short of the present requirement, but there are some serious shortages, particularly in the age band 25-30 generally, and in officers with qualifications suitable for the technical arms.

There is room for an increase in the entry to Sandhurst, and also in the numbers of entrants who are capable of education to Honours degree standard in Engineering or Science. To this end the Army Council is opening a pre-Sandhurst school at Welbeck Abbey in September, 1953, for boys at about the age of 16. The course will last two years, and is intended to give a good basic scientific education. This will lead, after training at Sandhurst, to a Regular Commission in one of the Technical Arms, and to an Honours degree education either at Cambridge University, or at the Royal Military College of Science at Shrivenham. The latter institution prepares students for external B.Sc. degrees of London University.

At the same time, a new method of obtaining a Regular Commission, parallel to the Sandhurst training, has been introduced. This makes use of the Royal Military College of Science and is intended for boys of good scientific ability, to whom it offers the certainty of an Honours degree education combined with the early grant of a commission. Entrants are given slightly modified National Service Commissions after the normal National Service training of roughly 6 months, and Regular Commissions after completing two years at the College.

While the Welbeck and Shrivenham projects should do much to eliminate the shortfall in the recruitment of regular officers, there remains the problem of the increasing age of the short service officer, many of whom have served since early in the war, and whose 8 year contracts are shortly due to end. An Extended Service Commission has been introduced, which enables selected officers to serve on beyond the end of their Short Service Commissions, and offers retired pay to those completing 20 years' reckonable service as officers. This will retain many officers who would otherwise be lost to the Army, but in view of the high average age of the short service officer cadre, it can be no more than a palliative.

The ban on retirement of officers which was imposed as a result of the Korean war, was lifted at the beginning of 1952. As expected, there was initially a considerable number of applications to retire, but the retirement rate soon settled at a more normal level. While this is rather higher than is desirable, there is no evidence of the rate of retirement being excessive, either in any individual branch of the Army, or in any particular theatre overseas.

### *Tradesmen*

The problems of NCOs and of officers have been covered in previous paragraphs. There is one other broad category which merits rather more than passing comment, namely tradesmen. The present-day Army depends to an ever-increasing extent on machines. Engines and electrical gadgets of all kinds have multiplied out of all knowledge, and have brought in their train an enormous demand for tradesmen and specialists of every sort not only to repair them in base workshops, but in many cases merely to keep them in operational trim in the field.

On the other hand, the system of universal National Service ensures that

the Services draw in a complete cross-section of the entire male youth of the country. It would indicate an alarming state of affairs if they still found themselves seriously short of *potential* tradesmen. The main difficulty is that the young tradesmen coming in for his compulsory two years' service, even though he has probably only just completed an apprenticeship, is not fully skilled. He lacks general experience and above all he lacks army experience. His skill is rarely above what the Army calls Class III. But the Army needs a substantial proportion of Class II tradesmen, and a good sprinkling of the real experts of Class I standard. While many of the National Service entry are admirable material for training up to these standards, it is questionable whether it is an economically sound proposition to devote a large part of their two years' service to such training, even taking into account their subsequent reserve service. The Army therefore relies primarily on longer-service regulars to provide its more highly skilled tradesmen, and it is in consequence seriously short of such men at the present time.

The cure lies, as in the case of NCOs, in somehow improving the regular structure and the means suggested earlier in this article, namely higher extension rates and a larger boy entry, are equally applicable to the tradesmen problem. Every effort is being made to ensure that young regulars now entering the Army are given the opportunity of learning a service trade. The Army is however on the horns of a dilemma in this matter. With the new engagements it cannot be sure that men selected for training will stay with the colours long enough to qualify beyond Class III. But unless substantial numbers do so, there will be no improvement. We shall simply have spent a great deal of money and effort training *ab initio* large numbers of men up to Class III standard, when all the Class III men we needed were in all probability available ready trained from the National Service entry.

In the more skilled trades, moreover, there is among the normal regular entry a dearth of suitable candidates, and this can only be made good by the boy entry, where the average quality is normally higher. The logical solution to the whole problem would seem to be to rely entirely on the boy entry for the longer service highly skilled man. But the cost of such a plan is likely to be prohibitive and there is in any case no indication at present that sufficient boys would enter the Apprentice Tradesmen Schools to make it practicable, although the number of regimental (non-Tradesmen) boys is steadily increasing.

There are, of course, some Army trades which have no civilian equivalent and here the National Service entry is of little or no assistance. Trades such as "ammunition examiner" fall into this category, and there are serious shortages in a number of trades of this sort. There are also some trades where civilian industry is itself suffering from acute shortages and this is reflected in similar difficulties in the Services. The supply of junior electronic artisans, both from National Service and from Regulars, mostly ex-boys, is steadily improving. But the demand in the Army is also increasing and it will be some time yet before the supply catches up with it.

#### WOMEN'S ROYAL ARMY CORPS

In 1949 it was decided to make the wartime Auxiliary Territorial Service, in which women had so effectively served the Army during the war, into a permanent feature of the peace-time organisation, and the

Women's Royal Army Corps was born. Its primary function in peacetime was to keep the organisation and tradition of the Women's service in being and so provide a nucleus on which to expand in war. The growing difficulty in finding enough men led, however, to a change in this conception of its functions, and since 1951, the emphasis has very naturally been on making greater use of women in peacetime in place of men.

In the modern Army there are a great number of tasks, apart from the traditional work of nursing, which women can undertake as well as, and in many cases, better than men. The difficulties are primarily administrative. The jobs are there, but it is not always easy to fit the women into them, because for obvious reasons they cannot just be posted individually to a predominantly masculine unit and left to fend for themselves.

During 1952 a detailed study of the whole problem was made, and plans drawn up for greatly extended employment of women in place of men. Having decided where this was practicable, the next step was to attract the necessary extra numbers to enlist. A number of proposals to this end were examined, including among others, the suggestion that women should be enlisted direct into the various arms of the service, instead of, as at present, enlisting into a central organisation and being, so to speak, "loaned" to the employing arm. The several advantages of this proposal, however, were found on balance to be outweighed by its disadvantages. It would have been impossible under it to ensure an equitable system of promotion, and, above all, it would have conflicted with the fundamental principle that women should be administratively controlled by women, though "technical" command may be exercised by men. No change in the present basic organisation of the women's service is therefore planned.

The problem of recruiting is however being tackled with vigour and results to date have been very encouraging. Early in the recruiting drive it became apparent that the provision of suitable living accommodation would be a difficulty, and in this connection, an experimental scheme now being tried out in Edinburgh is of great interest. Under this scheme women are enlisted in the Women's Royal Army Corps for local service only with the intention that they should serve the Army in peacetime while continuing to live at home. Only in the event of general mobilisation would they become liable to general service world wide.

This is only one of several measures which have been and are being taken to enable the number of uniformed women serving in the Army to be substantially increased. Women are already making a considerable contribution towards solving the Army's manpower problem and there is every hope that in the course of the next year or two this contribution will be further increased. In return the Army offers, among other things, a most attractive uniform, an opportunity to see the world and a more than usually favourable start in the marriage stakes!

## THE RESERVES

### *Build-up of the Organised Reserves*

The build-up of National Service men doing part-time service in the so-called "organised reserves", that is, in the units of the Territorial Army and the Army Emergency Reserve, is due to be completed by July, 1954. The final number reached will be less than originally planned, because the increase of whole-time service made in 1950 was accompanied

by a compensating cut of six months in the period of compulsory part-time service. Apart from this, the build-up is going very much according to plan and the difficulties are proving to be mainly administrative.

#### *Balance between Territorial Army and Army Emergency Reserve*

The basis of the Territorial Army is geographical, and local loyalties play an important part in its make-up. The men for a given unit are all drawn from a strictly defined area, because their homes must be within reasonable distance of their unit or sub-unit in order to enable them to meet their training obligations. This requirement imposes a severe limitation on the field from which National Service men for the Territorial Army can be selected, and the result has been that an undue proportion have up to the present been assigned to the Army Emergency Reserve. Units of the Territorial Army therefore tend to be short of men, while the Army Emergency Reserve has more men than it can conveniently absorb.

This difficulty was foreseen, and towards the middle of 1950 a scheme, known as the "Red Area Scheme," was introduced specifically to meet it. The basis of this scheme, is broadly, to ensure that, wherever possible, a National Service man is placed *on initial call-up* in an arm of the Active Army which is represented in the Territorial Army by a unit or sub-unit in the neighbourhood of his home. There are obvious limitations to such a scheme, and its effect in any case only began to be felt in the Reserves towards the end of last year. As time goes on, however, it should prove of material help in correcting the balance between the two main sections of the organised reserves.

#### *Balance between Arms of the Reserve Army*

Apart from the problem of making a proper division of the available National Service manpower between the Territorial Army and the Army Emergency Reserve, there is also considerable difficulty in striking a correct balance between individual arms and services in the Reserve Army as a whole. For example, the manpower requirement of the Royal Artillery in the Reserve Army, which supplies the bulk of the units of Anti-Aircraft Command, is proportionately much greater than in the Active Army. There will in consequence never be enough National Service gunners passing into the reserves to meet it. A similar situation occurs in the Royal Engineers, while in the Infantry and Royal Army Ordnance Corps the position is reversed. To meet this situation it has been necessary to resort to a system of inter-corps transfers, which are carried out when the men pass from whole-time to part-time service. As a result of this policy, it is expected that in due course the National Service content of Royal Artillery units in the Reserve Army will comprise some 25% of men whose active full-time service was performed in some other arm. In the case of anti-aircraft and coast defence units, the proportion is likely to rise to 50%, and in the Royal Engineers it will average 30%.

#### *The Volunteer Problem*

Both the Territorial Army and the Army Emergency Reserve are fundamentally dependent on a strong voluntary element. In this respect, the situation in the Territorial Army is reasonably satisfactory, and encouraging numbers of part-time National Service men are already accepting the

additional obligations of the volunteer. This is of vital importance, because the future voluntary cadres can, for practical purposes, come from this source and nowhere else. It remains to be seen however, how many of them will continue their voluntary obligations when they finish their part-time service and the impulse of compulsion is removed. In the Army Emergency Reserve, the position is not nearly so satisfactory, and many of the planned units remain unformed largely because of the lack of the essential volunteer cadres round which to build them. The name "Army Emergency Reserve" was adopted in place of the former title of "Supplementary Reserve" mainly with a view to emphasising the importance attaching to this section of the Reserves, but it is still proving difficult to stimulate much interest. In certain instances, where the appeal is to a well-defined section of the community, as in the case of the Transportation Units of the Royal Engineers (Army Emergency Reserve) this difficulty is being successfully overcome, but generally it remains unsolved. The Z-reserve training scheme provided temporarily a fruitful source of volunteers, but with its termination in 1952, this source has, of course, dried up.

#### *Officers in the Reserve Army*

The "Red Area" scheme described in a previous paragraph applies to other ranks. A similar scheme for officers called the "Green Area" Scheme was introduced to ensure that, consistent with the requirements of the Regular Army, National Service Officers are, as far as possible, posted during their full time service to Arms and Units which are represented in the area in which they are likely to live during their part time service.

The Scheme has certain limitations, the chief one deriving from the uneven spread of the officer potential as between the South and the North and West of the Country. For instance, 45% of all National Service officers live in London and the seven adjacent counties, while this area only needs 28% of the total TA National Service requirement. The Green Area Scheme does ensure, however, that as far as possible TA units are officered by officers living within reasonable distances of them. Where this is not possible "long range" postings from surplus to deficiency areas have to be arranged.

#### *Individual Reserves*

Even when the build-up of the organised reserves is complete, there will still be a requirement, in the event of general mobilisation, for very large numbers of individual reservists. They will be required to place the Army on a war footing and to provide the reinforcements necessary until men from the war-time call-up can be trained and become available. There is also a requirement for lesser numbers to be available for recall to the colours in the event of an emergency not amounting to full mobilisation, such as that in Korea in 1950. The first of these requirements is met at the present by the Z-Reserve, and the second by the Royal Army Reserve.

#### *Z-Reserve*

The term "Class-Z Reserve" refers strictly only to other ranks, but is used loosely to include also Emergency Commissioned officers. It comprises men who served in the Army during the war period, together with

those called-up after the war until December 31, 1948, when the new National Service Act came into force. These men had no part-time training liability on their release from the Army, and were placed on the Z-reserve. From among these very large numbers the Army has sorted out those who, owing to their qualifications, age and medical classification, would be suitable to fill vacancies in units on mobilisation. Their names have been submitted to the Ministry of Labour for a decision as to their availability for recall. Where the Ministry of Labour has indicated that a man may be regarded as being available to the Army on mobilisation, he has been earmarked to fill a vacancy in a unit or to be sent as an individual reinforcement to a theatre overseas.

Z reservists are, of course, a very valuable source of manpower to the Army because of their war experience and the fact that many of them are skilled tradesmen, or held commissioned or non-commissioned rank. In fact they would provide some 80% of the reservists required to put the Army on a war footing should this be necessary in the course of the next few years. But of course their value as a mobilisation asset will decline as the years pass, as the men get older and their service experience becomes more rusty. For this reason, it has been decided, as recently announced in a Government White Paper, to introduce legislation whereby the National Serviceman, when he finishes his part-time service, will remain liable for recall for a further period of five years. Thus a new reserve of trained manpower will be built up to take the place of the ageing Z reservists. It is the intention that, because these National Servicemen will be young men with very recent experience in the Army, they will be used to the greatest possible extent on mobilisation in preference to the older and more rusty Z reservists. However, for some time to come there will still be a requirement for Z reservists, both numerically because the numbers of National Servicemen with only a five-year liability will not build up sufficiently to supply the Army's needs on mobilisation, and because the Z reserve will still remain the main source of supply for the mobilisation requirements of the middle piece officer, the senior NCO and many of the skilled tradesmen and specialists.

Although the Z reservist has no statutory liability for training, it was decided, as a special measure in view of the dangerous international situation, to recall substantial numbers of Z reservists for a fortnight's training in 1951 and a further contingent in 1952. This step, which required legislation in Parliament, was most necessary and valuable in the interests of preparedness for war. In particular, it enabled many units of the Reserve Army, which were at that time only beginning to receive their complements of part time National Service men, to undertake effective unit training. The special measures taken in 1951 and 1952 are not however being repeated in 1953, nor is it intended that the National Service man on completion of his part time service and transfer to the new reserve, shall have any further training obligation.

### *The Regular Army Reserve*

Men enlisting as regulars engage initially for a period of years with the colours followed by a further period of so many years in the reserve. If they do not extend their colour service they are transferred to the Regular





A detachment of the Household Cavalry Regiment, which played a prominent part in the Coronation ceremony





Army Reserve. They have a training liability of 12 days per year, which is seldom enforced.

They can, if they wish, volunteer for Section A of this reserve, where they receive slightly higher rates of reserve pay and accept in exchange a greater liability to recall. Apart from a small number of volunteers in certain special categories of the Army Emergency Reserve, they are the only reservists who can be recalled in an emergency without "Proclamation". For practical purposes, this means that they are the only source of additional trained manpower immediately available in an emergency. If more are required, they can only be obtained by measures which amount to partial or general mobilisation.

Partly by reason of its voluntary nature and partly as a result of the war when regular recruiting ceased and the poor rate achieved when it reopened, Section A of the Royal Army Reserve is at present far too small. In 1949, however, terms of regular engagements were changed, and men enlisting since then have a liability to serve the first year of their reserve service on Section A. This will result in a rapid build-up of men in this part of the reserve from early 1955 onwards, but in the meantime the numbers will remain very small.

#### MANPOWER—SELECTION TESTING

It has not been possible in this short article to deal with the major manpower planning problem of selection testing of regular and National Service recruits and potential officers so as to post them to the best arm and to the most suitable trade in that arm. This is a very large subject which deserves an article to itself. Much research has been expended, and great advances have been made since it was first properly inaugurated in the Army in July, 1942. The system now deals with over 10,000 men a month, year in year out. It speaks very highly for its success that so many round pegs are nowadays undoubtedly fitted into round, rather than square holes.

#### SUMMARY

Perhaps the best summary to this article is a mechanical metaphor. The insistent claims of the cold war in 1950 placed demands on the Army's manpower economy which threw heavy strains upon its structure and mechanism. The machine was suddenly called upon to deliver greatly increased power, and additions had to be hastily made to enable it to boost its output. These additions, temporary or at best semi-permanent, threw very heavy strains upon the main manpower frame, already weakened by poor maintenance during and after the war. In 1952 with the introduction of the new system of engagements a fundamental reconstruction of the permanent framework began. This reconstruction is not yet complete, and it is already clear that certain parts essential to its completion are missing. Provided however that these parts can be found and fitted into their proper places, there is no reason why the new machine should not prove as efficient and powerful as the old in peace, while being geared at the same time to undertake a far more rapid and effective expansion, if war comes, than this country has ever previously contemplated throughout its long history.

E. H. W. COBB

## CHAPTER XXV

### THE DUTIES OF THE ARMY STAFF

BY COLONEL THE HON. E. H. WYNDHAM

FIGHTING FORCES depend for the execution of their functions, whether at sea, on land, or in the air, upon efficient administration. Their human element needs to be fed, clothed, and its morale sustained. Weapons and ammunition need to be supplied and replaced when unserviceable. Ships, vehicles and aircraft need to be supplied with fuel and maintained in working order. When all these administrative wants have been fulfilled, the movements and actions of the fighting portion of the Services need to be planned and coordinated. It is to perform these functions that all Services are provided with a staff.

It should be noted that the task is not the same in all three Services. At sea, a ship can fill up in harbour with all that it requires for a long voyage and can act as a self-contained unit for whatever period the supplies it carries last, when it must return to port for replenishment. Moreover, the crew take their home about with them, and are faced by no problem of constantly-changing accommodation. In the air, aircraft can only work efficiently if based on the static organisation by which they are serviced, from which they set forth to carry out their tasks and to which they return. The administrative organisation is static and only moves very occasionally and as seldom as possible, becoming again static after the move.

On land the problem is much more complicated. For the successful performance of their duties armies need to be constantly in motion. They have no self-contained conveyance like a ship to assist them; their supplies have to follow them and catch up with them day by day. For example, the refuelling of an armoured division may even in certain circumstances require the expenditure of more petrol on the journey of the supply columns forward and back than the amount delivered to the division in its forward area. In view of the fallibility of human nature, and the difficulties inherent in war, it follows that the operational and administrative tasks of the staff will not always be performed to perfection. Mistakes and shortcomings are bound to occur. The staff, therefore, are constant targets for criticism by both military and civilian opinion. Under the stress of war everybody at times feels the need to let off steam by criticising somebody or something, and the staff are an obvious target for this. That this has been true throughout the ages is proved by the following. Livy records that in the year 168 B.C. Lucius Aemilius Paulus, a Roman Consul, who had been selected to conduct the campaign against the Macedonians, went out from the Senate House into the assembly of the people and addressed them as follows:

“In every circle, and, truly at every table, there are people who lead armies into Macedonia; who know where the camp ought to be placed; what posts ought to be occupied by troops; when and through what pass that territory should be entered; where magazines should be formed; how provisions should be conveyed by land and sea; and when it is proper to engage the enemy, when to lie quiet. And they not only determine what is best to be done, but if any thing is done in any other manner than

what they have pointed out, they arraign the consul, as if he were on trial before them. These are great impediments to those who have the management of affairs; for every one cannot encounter injurious reports with the same constancy and firmness of mind as Fabius did, who chose to let his own ability be questioned through the folly of the people, rather than to mismanage the public business with a high reputation. I am not one of those who think that commanders ought at no time to receive advice; on the contrary I should deem that man more proud than wise, who regulated every proceeding by the standard of his own single judgement. What then is my opinion? That commanders should be counselled, chiefly, by persons of known talent; by those who have made the art of war their particular study, and whose knowledge is derived from experience; from those who are present at the scene of action, who see the country, who see the enemy; who see the advantages that occasions offer, and who, like people embarked in the same ship, are sharers of the danger. If, therefore, anyone thinks himself qualified to give advice respecting the war which I am to conduct, which may prove advantageous to the public, let him not refuse his assistance to the state, but let him come with me into Macedonia. He shall be furnished with a ship, horse and a tent; even his travelling charges shall be defrayed. But if he thinks this too much trouble, and prefers the repose of a city life to the toils of war, let him not, on land, assume the office of a pilot. The city, in itself, furnishes abundance of topics for conversation; let it confine its passion for talking within its own precincts, and rest assured that we shall pay no attention to any councils but such as shall be framed within our camp."

How many times during the last two thousand years have military commanders either used, or wished they could have used, similar language?

While even the most primitive forces in very early times must have required some sort of embryonic staff to administer them, it will suffice to go back to the Feudal age to start the story of the growth of the staff to its present dimensions. The army was then divided into thousands under an officer called a millenar, sub-divided into hundreds, each under a centenar, and further sub-divided into twenties, each under a vintenar. The King usually commanded in person, assisted by two principal staff officers—the High Constable and the Marshal, who corresponded roughly to the Adjutant and Quartermaster-Generals who will appear in due course. Tactically the army was distributed into three permanent divisions, called the vanguard, battle and rearguard, which retained these names whatever their position in the field or on the march. Signalling took the form of trumpet-blowing; but as it seems probable that there were no distinct calls, the interpretation of the soundings of the trumpet must have been dependent on orders previously issued.\* Perhaps the first person to occupy a position analogous to the modern Chief-of-Staff was Sir John Chandos, right-hand man to King Edward III in the early campaigns of the Hundred Years War, and responsible for the tactical doctrine which won the Battle of Poitiers.

The first development towards the expansion of this embryonic staff occurred in the latter stages of the Hundred Years War with the formation of the office of Ordnance for the custody of military stores. The office of Master-General was created in 1483, and continued to exist, though in

\* *History of the British Army*, Vol. I, p. 30.

varying forms, until just before the outbreak of the Second World War. In the early part of the 19th century it carried Cabinet rank and a seat in the House of Lords.\* The Board was responsible for the supply of arms, munitions and stores for both the Navy and the Army, and had charge of barracks and fortifications. When the Royal Artillery and Royal Engineers came into existence, they were at first under the Board. During the Tudor period there was a fairly considerable development in staff organisation, and by the end of the reign of Queen Elizabeth I there had come into existence the General of the Foot, the Lieut. General of the Horse, the Marshal, the Provost Marshal, the Master of the Ordnance, the Master Gunner, the Sergeant Major General, Muster Master, Scout Master, Forage Master, and Carriage Master. It will be seen that these appointments between them cover every department of staff duties.

The first big development of the staff coincided with the formation of Cromwell's New Model Army, when the following organisation was introduced.

#### *Headquarters Staff*

Chief of Staff  
 Commissary General of the Muster  
 Commissary General of Victuals  
 Commissary General of Horse Provisions  
 Wagonmaster General  
 Scoutmaster General  
 8 Treasurers at War  
 Judge Advocate General  
 Physician to the Army  
 Apothecary to the Army  
 Chaplain to the Army  
 Secretary to the Council of War  
 Messengers to the Army

To administer the *Foot*, there was a Major General, Quartermaster General, Assistant Quartermaster General, Adjutant General and Marshal General. To perform the same functions for the *Horse*, there was a Lieutenant General, Commissary General, Quartermaster General, 2 Adjutants General, Marshal General and Markmaster General.

The functions of the *Board of Ordnance* were carried out in the field by a Lieutenant General of the Ordnance, Controller of the Ordnance, Engineer General, Engineer Extraordinary, Chief Engineer, and two subordinates, Master Gunner of the Field, Captain of Pioneers, Commissary of Ammunition, and a Commissary of the Draft Horses.

It will be noted that the Army was not organised into divisions made up of all arms, but that each arm was in a watertight compartment of its own. Apart from this important difference, we see in the staff of the New Model Army the first appearance of the principles which have governed the staff organisation ever since. It was an immense advance on anything that had gone before.† Cromwell's innovations in staff organisation were carried a step further by the establishment of the incipient organisation of a War Department in the form of a Committee of the Army working with the Treasurers at War on the one side and the Office of

\* *History of the Army*, Vol. I, p. 111.

† *History of the British Army*, Vol. I, pp. 221, 222.

Ordnance on the other, and the appointment of a single Commander-in-Chief for all the forces in England, Scotland and Ireland,\* an office first held by Monk.

This was the position at the Restoration and, as Charles II owed the recovery of his throne to Monk, the latter naturally continued in his appointment when it was found that the first hope of being able to abolish the standing army altogether was not practicable. This hope, of course, was the result of the unpopularity of the rule of the Major Generals under Cromwell.

After the suppression of Monmouth's Rebellion, the office of the Commander-in-Chief was not renewed. James II and William III both personally directed the army. We now see the foundation of the office of Secretary at War, which was to continue for so long and be often so anomalous in its functions. By the terms of his commission, the Secretary at War had to obey not only the orders of the King but also the orders of the Commander-in-Chief, if one was appointed. He was really the King's Secretary for Military Affairs, but with no more power than a private secretary usually enjoys.

As a contrast to the simplicity of military administration in the 17th century, compared to its complexity today, it is interesting to note that in 1673 the Secretary at War's office used less than £20 worth of stationery in a year, and in nine months consumed three bottles of ink, eight best penknives, one bag of pounce, and one bag of sand. As time went, on this office gradually became responsible for all the administration not in the hands of the Commissary General or the Board of Ordnance.†

The Commissary General came into existence during the reign of William III. He was a civilian Treasury official, and was responsible for the supply of the army through his civilian agents in garrisons at home and abroad.

When William III came to the throne he was faced with the problem, usual in England in those days, of maintaining a permanent military establishment in face of the national dislike of one. As already mentioned, the office of Commander-in-Chief had been abolished, and the King maintained personal control of the army, Commanders-in-Chief being appointed temporarily for special purposes and for limited periods. William compromised with Parliament by completely separating command from the business of administration of the army. Command and discipline were vested in the Crown, acting through one of the Secretaries of State, while the administration was under Parliament. This division of responsibility was to remain the corner-stone of military administration for more than a century. It was regarded as of such importance that Lord Palmerston once said: "If ever it comes that the power of rewarding military service should be transferred from the Crown to the House of Commons, those who saw it might say they had witnessed the death blow of the Constitution." Both soldiers and civilians agreed that this separation of functions was correct, but to make the system work each half should have acted as a check on the other. This, in fact, did not take place. It continued in force for at least a century and a half, and even acted as a model for foreigners to copy. The Prussians adopted the same

\* *Ibid.*, p. 284.

† Clifford Walton, *History of the British Standing Army, 1660-1700*.

system in 1821, largely on the advice of the Duke of Wellington, but, unlike us, they worked it properly. The military side and the administrative side acted as checks on one another, and in case of difficulties, the casting vote lay with the King.\*

Throughout the 18th century we continued to work this system in the wrong way, and it is important to bear in mind that throughout this period no attempt was made to train officers in staff duties or to have any permanent staff organisation with the troops themselves. In 1793 the office of Commander-in-Chief was revived and first held by Lord Amherst. The nature of his duties and the scope of his authority was not defined, and at that time the Adjutant General occupied rooms in Crown Street, Westminster, and the Quartermaster General one room in the War Office. Both were under the Secretary at War, and not the Commander-in-Chief. The following year the office of Secretary of State for War was created, with Henry Dundas as the first holder. He only exercised general control over administration. He does, however, provide an important landmark in the development of the system, because he wrote a very bold letter to George III asserting in strong, though respectful, language that in military affairs the sovereign was bound to take the advice of his responsible ministers. During the Peninsular War, Wellington's staff was organised on the following lines. He had a Military Secretary, who was a sort of confidential clerk; a Quartermaster General and an Adjutant General, who were provided with assistants in increasing numbers as the war went on. It will be noted that there was no General Staff as we understand the term today. Operational staff duties were mainly in the hands of the Quartermaster General, who combined them with the Q functions which remain with him to this day.

The staff also comprised :

- (1) A G.O.C. Artillery, who had general supervision over the batteries attached to divisions, a more specific control of the battering train, reserve artillery and the ammunition columns.
- (2) A C.R.E., who superintended the engineer officers attached to divisions and controlled the "Royal Military Artificers", as the rank and file of the scientific corps were called until 1812, when they became the Royal Sappers and Miners.
- (3) A Provost Marshal and O.C. Staff Corps Cavalry, which corresponded to the Royal Corps of Military Police.
- (4) An O.C. Corps of Guides, which provided interpreters and guides to bodies of troops moving in unfamiliar country.

There were also seven civil departments :

- (1) Medical, under the Inspector of Hospitals.
- (2) The Purveyor's Department, which administered the Hospitals.
- (3) The Paymaster General.
- (4) The Commissary General, who fed the army.
- (5) The Storekeeper General, who had charge of field equipment, tents and heavy baggage.
- (6) The Controller of Army Accounts.
- (7) A small travelling Printing Press.†

\* *Army Quarterly*, October, 1921; article by Major-General Sir Gerald Ellison K.C.M.G., C.B.

† Sir Charles Oman, *Wellington's Army*, Chapter 8.

In the closing years of the 18th century it occurred to some go-ahead person that war was a sufficiently difficult and dangerous undertaking to make it desirable that there should be some form of military educational facilities. The two prime movers in this matter were Col. le Marchant, a native of the Channel Islands, who had had quite a distinguished career in the army, and the Duke of Richmond of the day, Master General of the Ordnance. As it was a plan put forward by the former which ultimately came to fruition, it is not necessary to deal with the proposals of the latter. Le Marchant's first idea was the establishment of Regimental Schools, but he soon realised that that would not suffice because it would not ensure uniformity. He, therefore, decided that a central school for the training of officers was necessary. He submitted his scheme to the Commander-in-Chief, the Duke of York, in January 1799. In his reply, though sympathetic to the idea, the Duke despaired of removing the prejudice of the old school, but le Marchant brushed aside these doubts and two months later produced a detailed scheme for the establishment of a Military College under one Governor, divided into four Departments. The first Department was to be a school for the general instruction of boys from 13-15, who would not necessarily enter the army; the second Department for cadets who had made satisfactory progress in the first and who wished to obtain commissions; the third, the Legion, which was a school for N.C.O.s and for the sons of soldiers between 13 and 15 years of age; the fourth Department, a college for the instruction of officers of over four years' service to fit them for staff employment.\*

No Englishman could be found capable of fulfilling the duties of chief instructor, and accordingly a French émigré named Jarry was appointed and the school opened at High Wycombe in 1799. Two years later a royal warrant published on 24 January 1801 inaugurated the Royal Military College which was to be established at Bagshot Heath, where it has been ever since. It was to be divided into two departments—the junior department was a cadet school for the training of potential officers; the senior department was the germ from which the modern Staff College has gradually evolved. It is obvious that the College had been in existence too short a time to exercise any noticeable influence upon the staff work of the Peninsular and Waterloo campaigns.

It has often been said that soldiers always prepare for the last war instead of the next one. Although it is now a great many years since this was true of the British Army, it was undoubtedly true for the whole period from 1815 up to the Cardwell reforms of the 1870s. Between Waterloo and the outbreak of the Crimean War in 1854, the outlook of the army was simply 'what was good enough for the Duke of Wellington is good enough for us.' The small wars which took place in this period against uncivilised enemies in various parts of the Empire did nothing to weaken this regrettable complacency, and the army embarked upon the Crimean War without any idea of what war really meant, or any officers fully trained in staff duties. The disgraceful confusion which ensued caused an awakening in the country for the need for military reform. A Select Committee of the House of Commons was instituted to enquire into and report upon the state of the Royal Military College. The report was submitted on 15 June 1855. It pointed out that the deficiencies in the education provided

\* Godwin Austen, *The Staff and the Staff College*.



by the College were largely due to the fact that it was starved for money; and also considered that the presence of staff students amongst cadets was objectionable. They therefore recommended that a sub-committee should be appointed to consider the course of study for the senior department and frame an establishment of professors and masters for it; and that officers who passed through the College should not be neglected in the appointments to the staff. The evidence given before the Committee revealed that at that time no recognised manual of staff duties existed; no work on tactics was authorised by the staff of the Commander-in-Chief at the Horse Guards, nor was there any ruling on the duties of an Assistant Adjutant General or Assistant Quartermaster General. All this amounted to no more than the suggestion of a very small step forward, and it is not surprising that while the war lasted nothing was done. When the war ended, measures at last were taken to improve organisation and efficiency, and in January 1856 a Commission to make recommendations on the training of the staff was appointed by the Secretary of State, Lord Panmure. This Commission compared the Royal Military College unfavourably with foreign Staff Colleges, which they inspected, and recommended that attendance at the College be made a *sine qua non* for staff appointments, and, still more, "if staff appointments were given in accordance with the distinction of its pupils, the College would almost necessarily be frequented by most of the young officers of talent and energy in the army." But, even so, the Report retained traces of the old complacency. It contained the statement: "No radical alterations are required in our present system. We have the Institution already, and nothing is required to make military education more efficient except to secure that these colleges should have their proper opportunities of working well." The Commission also recommended the formation of a Board of Military Education at the War Office. This was done.

The Duke of Cambridge, who had now become Commander-in-Chief, displayed considerable interest in the question of military education and was largely responsible for the establishment of the Staff College in its present form. In General Order No. 685, dated 9 April 1857, he set forth the qualifications to be demanded of staff officers from and after 1 January 1858. This was an interim measure until the considered views of the Council of Military Education should decide on a permanent policy.

But unfortunately the habit of training for the last war instead of the next one still prevailed. The Crimea had been a static campaign mainly of trench warfare. Accordingly, the conception of war which prevailed during the early days of the Staff College was practically that of siege warfare; no attempt was made to study staff duties as we understand them today. The curriculum was very suitable for the training of officers of the Royal Engineers, but was completely out of touch with the needs of a staff officer of a fighting formation in war. While, with the passage of years, the curriculum gradually became more practical, it was not really until the College was reopened after the First World War that the academic atmosphere was completely shaken off.

The continental campaigns of 1866 and 1870 very naturally had a profound influence upon military thinking everywhere. One shudders to think what would have happened if the British Army in its then state had been involved in the campaign of 1870 in France. This campaign

and the advent of Mr. Cardwell of the War Office as Secretary of State were responsible for the next step forward. In 1873 an Intelligence Branch was formed at Army Headquarters, and in 1886 the Mobilisation Branch came into existence. But there was still no branch of the staff entrusted with the coordination of organisation, training and intelligence in preparation for the most probable operations of war. However, a younger school of keen and intelligent officers, led by Sir Garnet Wolseley, was growing up, and the Egyptian campaign of 1882 under his command was, from the point of view of staff duties, an amazing improvement on anything that had happened before in the British Army.

At the end of the century, the South African War proved that we still had much to learn in the matter of staff organisation and training, and the Esher Committee was appointed in 1904 to consider the matter. It rightly insisted on the necessity for the formation of a General Staff to prepare the army for war. This recommendation was adopted in a Special Army Order published on 6 January 1905. Army Order No. 233, of October 1906, by which time, of course, Mr. Haldane had become Secretary of State for War (so immensely to the advantage of the Army) divided the General Staff into (a) General Staff at Headquarters, (b) General Staff in Commands and Districts. The Imperial Conference of 1907 affirmed the need of a general staff selected from the forces of the Empire as a whole, and this system was extended by the Conference of 1909. It should, however, be noted that the staff organisation of the British Army differed from that of continental armies in that it was divided into three coequal branches—General Staff for operations and intelligence; Adjutant General's Branch for discipline and personnel; Quartermaster General's Branch for supply. Unlike their continental opposite numbers, the British commanders did not have a Chief of the General Staff but three coequal Chief Staff Officers, one for each branch, a system which prevailed until it was altered in the course of the Second World War.\*

As already mentioned, the Prussian Armies of 1866 and 1870 revolutionised military ideas in Europe, and it is therefore worth while to turn aside for a moment and consider briefly the staff organisation of the German Army. As has already been mentioned, they originally copied our system in 1820 and worked it properly when we did not. But the modern German General Staff started in 1852 when, for the first time, General Staff Officers were attached to divisions in peace time. This ensured the principle of unity of doctrine which was the secret of the army's great triumph in 1870. After 1870, the Emperor exercised authority through a Military Cabinet, a Ministry of War, Great General Staff and Army Corps Commanders, Army Inspector Generals and Technical Inspector Generals. The Chief of the Military Cabinet, the Minister of War and the Chief of the General Staff were the three highest military authorities, in practice coequal and directly under the Emperor. In 1914, the Chief of the General Staff had under him five Assistant Chiefs, each in charge of a section of the staff: (1) Foreign Armies Section; (2) Fortress Section; (3) Railway Section; (4) Historical Section; (5) Topographical Section. The Minister of War was entirely responsible for administration, thus leaving the General Staff free to concentrate on operations; while the Chief of the Military Cabinet exercised coordinating functions.

\* The above paragraphs are based upon an article published in the *Army Review* of 1911.

It is worthy of note that the British Army had only possessed a properly organised General Staff for barely eight years when the First World War broke out in 1914. It should also be noted that at that time the Royal Navy had no properly organised staff and no system of instruction in staff duties. One of the earliest events of the war seems to indicate that ideas on the full functions of the General Staff were still in a very elementary stage of development. When the British Expeditionary Force had completed its concentration in Northern France, based upon Havre and Boulogne, before a shot had been fired the Commander-in-Chief, Field Marshal Sir John French, found it necessary to order a reconnaissance to be carried out in case it was necessary to change these bases to ports further to the West in the event of his army being driven back. It was, indeed, fortunate that he had the foresight to do so. Conversations between the British and French General Staffs concerning plans to meet the eventuality of a war with Germany had been in progress continually since 1906. It is surely a very serious criticism of a plan which took eight years to prepare that even before any contact had been established with the enemy it was necessary to arrange the improvisation of a major change. Nothing comparable to this occurred during the Second World War. The technique of advance planning had by then been learnt, and the failures in planning which occurred, for example, in the Norwegian campaign, were due to the hasty improvisation of plans, the need for which had not been foreseen.

It has been pointed out on a previous page that under the regime of Mr. Haldane as Secretary of State for War, the General Staff was divided into (a) General Staff at Headquarters, (b) General Staff in Commands and Districts. There is, of course, a difference between the work to be carried out by the former and by the latter. The same applies to the staffs of all armies. It is the duty of the Staff at Headquarters to implement the policy laid down by the Government—that is to say, they have to plan and to provide. It is their duty to decide upon the forces required for the defence of the country, and to make it clear to possibly hostile nations that the policy of the Government of the country can, if necessary, be backed by adequate force. In this phase of their work they will, of necessity, be guided, and in all probability be considerably hampered, by the amount of money which the Exchequer can find for the fighting forces. Having made up their minds as to the size of the forces required to implement national policy, conditioned as necessary by financial considerations, they next have to decide on how they should be equipped and trained, and arrange for the provision of weapons and of other necessary stores.

The Staff at Headquarters of Commands and Districts, and under this heading of course are included the staffs of fighting formations, have a different task to perform. They are in contact with the actual troops whose duty it will be to do the fighting if war breaks out. It is their task to see that these troops are fully trained and prepared to implement Government policy, should force be necessary to this end. They can only do this, of course, within the limits permitted by what is supplied to them from above. Their task will be rendered infinitely more difficult if the troops are below strength and weapons and equipment are in short supply. If, as is usually the case in the British Army in peace-time, it is their unfortunate fate to work under these conditions, they will

need to be endowed with a high degree of imagination if they are to lend realism to training, since it is obvious that training for war which bears no resemblance to the real thing will be of no value whatever. They will need at all stages of their work to be in the closest possible touch with the regimental officers and men under their control; and here it may be well to interpolate the warning that the importance of this should never be forgotten at any level. The upper strata of the staff—those engaged in planning and providing—will not plan or provide to the best advantage if they become completely office-bound and lose touch with those whose duty it will be to take the field in war. The importance of this point cannot be stressed too strongly.

When war breaks out, the duties of the upper strata to plan and provide remain very much the same as they are in peace, except that they move at an infinitely greater pace and impose an infinitely greater strain upon those who have to perform them. But the duties of the staff serving with fighting formations are very different in war from what they are in peace. In peace-time training, the conditions of war have to be imagined: when war breaks out, they are actually present and everybody is permanently conscious of them. Many administrative services which in peace-time exist either only on paper or in embryonic form, suddenly spring into existence and assume gigantic proportions. Nobody has been able to acquire any practical experience of handling them in peace-time. Here imagination and initiative are called into play, and, unless endowed with them, the staff will fail.

Whereas in past ages it was to a considerable extent possible to regard warfare on land and at sea as being in two watertight compartments, the experience of the wars of the 20th century has completely demolished that easy-going and narrow-minded conception. The air is superimposed over both land and sea, and air forces function impartially over both. The air is an ever-present problem in all operations of war, and there are indeed very few from which the sea can be completely excluded. Hence we have seen within the present generation the development of joint planning staffs. It is worth noting that as recently as 1914 such a thing would have been impossible because the Royal Navy had no trained staff officers at that time. As has already been pointed out in this chapter, the staff duties of the three fighting services all differ in character. Apart from this fact, there are, of course, differences in the outlook of one service from that of another. Modern war therefore renders it essential that an inter-service staff organisation and method of working should be evolved.\* When one remembers that British participation in war has throughout the ages been dependent upon sea power, and every British army that has ever fought abroad has had to be transported to the seat of war by sea, it is curious to note how long it took for the need for any cooperation in staff matters between the services to be appreciated. At the end of the First World War, when the Army Staff College at Camberley was reopened, and the Staff Colleges of the Royal Navy and Royal Air Force were first established, it became customary for the exercises in combined operations to be carried out by the students of these three Colleges annually, and for a week or so they all thought on inter-service lines. But nothing of the sort had ever been seen before. Today, superimposed upon these three

\* See article in R.U.S.I. Journal, February 1946.

seats of learning, we have the Imperial Defence College and the Combined Services Staff College, both of which think not merely in terms of inter-service cooperation but also consider the need for the fighting services to cooperate with civilian organisations, railways, shipping companies, munition factories and civil authorities generally. It is surely inconceivable today that a plan which took eight years to prepare would show traces of such complete lack of elementary foresight as did the plan for concentrating the British Expeditionary Force in France in 1914, referred to on a previous page.

Today staff organisation has progressed beyond the inter-service level on to the international level. Integrated staffs with officers of different nationalities serving all together in every branch came into existence for the first time in history in the second half of the Second World War. In view of the unsettled state of the world today, they have become a permanent feature, even though there is only a cold war and not a hot war at the present moment. Nor are they ever likely to disappear entirely, even if the cold war should come to an end. If any system of collective security is to be successful, it must be backed by power; and, if it is to have power, it will need an integrated military staff to control the forces at its disposal.

Such, in brief outline, is the remarkable development which has taken place in staff organisation and duties within the memory of those who have not yet got beyond middle age—a development within the life of one generation much greater than had taken place in the preceding centuries. Space does not permit the drawing of elaborate comparisons between the past and the present in this respect, but it is worth drawing the following comparison between the staff of an Infantry Division in 1914 and today.

1914  
3 General Staff Officers  
A.A. & Q.M.G.  
D.A.A. & Q.M.G.  
D.A.Q.M.G.

*Today*  
6 General Staff Officers  
1 Intelligence Officer  
3 Liaison Officers  
A.A. & Q.M.G.  
D.A.A.G.  
D.A.Q.M.G.  
2 Staff Captains  
3 Staff Officers Education

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*Total 6*

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*Total 18*

It will be seen that the actual number of staff officers with operational and administrative status is exactly trebled and in addition to this, it must be remembered that the increase in the ancillary services has been at least as great. No wonder it is a common complaint today that the Army has too much tail and too few teeth.

In conclusion, it may be well to summarise the necessary characteristics of a good staff officer. He needs a vivid imagination and a quick brain; the hide of a rhinoceros and the temper of angel; he must have good manners and a sense of humour, and be a good judge of his fellow men. Under the conditions of war today he no longer suffers to any great extent under his former disadvantage of constantly having it thrown in his teeth that he lives safely out of range of the enemy, in contrast to the dangers

to which those in the front line are exposed. Today the dangers of war extend to all and sundry, and with the advent of the atomic bomb may even be greater in rear than they are in the front line, since nobody is likely to drop an atomic bomb where its effects would be felt by their own troops. But whether he is living in safety or in peril, the most important consideration of all for the staff officer is to make sure that he never loses touch with the troops.

E. H. WYNDHAM

NOTE.—After this chapter had gone to press it was pointed out to the author that the statement on pages 314 and 315 to the effect that the Royal Navy had no system of instruction in staff duties in 1914 is not quite accurate. The Naval War Staff was created in 1912, and a course of instruction in staff duties started at Greenwich at the same time.

## CHAPTER XXVI

### FIFTY YEARS OF FLYING

By E. COLSTON SHEPHERD

WHAT THE Wright brothers did to the world fifty years ago was to present it with a challenge rather than to endow it with a new source of wealth and satisfaction. They flew indeed as no men had flown before, using mechanical instead of muscular or gravitational power; they preserved their balance in the air by scientific and mechanical means instead of by shifting the load to agree with the lift; they had found out things about propellers which the shipbuilders had never understood; they had a knowledge of lift and drag such as the experimenters of 400 years had not discovered. And it all led to a lumbering contraption launched on a rail, capable of an airspeed of less than 40 m.p.h. and a range of a few miles with a load of one pilot, uncertain in manoeuvre and temperamental at the landing. Flight had been accomplished, free, powered flight, in a form different from the thousands of gliding flights of a Lilienthal or the earthbound flight of Maxim's massive steam aeroplane. The limitations of centuries had been overcome. Knowledge laboriously acquired and tested in a number of fields had been brought together and proved in a single instrument of flight. A complicated secret had been penetrated and the result was human flight, a new means of movement for humans hitherto restricted to the solid earth, the promise of a new element for humans to explore and exploit.

A startling thing had been done; how startling is shown by the scepticism with which the reports of it were received and by the indignation of the pious who have always disapproved the flouting of nature's laws. Man had tried so long. Particular men had so often promised a solution and just failed to deliver it. The Wrights presented their success to a generation convinced that the trick could not be done and unwilling to be persuaded that they had been wrong. Nor could proof be produced for the millions by the opening of a hangar door. The home-made petrol engine was a doubtful and erratic source of power. The structure of the primitive aeroplane was easily liable to damage. The amount of lift and power available demanded a certain minimum amount of help at take-off from the wind. The tentative system of control and the limited knowledge of the inventors made turbulent weather unfit for flying demonstrations. For several years the scepticism endured. And who shall declare it unreasonable? Only the imaginative could see in these fumbling triumphs the germ of a revolution in transport and of a new and more terrible era in war. To the sober, doubting citizens, the thing was still a stunt and its practical application unlikely.

They might well be forgiven their lack of vision. What possible use could be foreseen for this fine-weather flying machine, skimming over the earth, entirely at the mercy of an unreliable engine, carrying a negligible load and having no assurance that it could reach a given destination or land safely on the way—except for those wild ones always ready to risk their necks and those modern Romans who would still have their circuses

dangerous? That summarised the challenge of the Wrights' achievement. It was different from the challenge of the steam engine and the motor car because it involved the new element and possible, unseen dangers at every seven-league step, and also because there seemed so small a chance of carrying anything at all considerable at a price which would make the process worth while. Only with much difficulty could a man get himself carried through the air. What other miracles of research and engineering might have to be worked to permit the urgent loads of commerce or industry to be carried either in areas where roads and railways were lacking or at speeds to compete with other forms of transport?

Practical prospects 50 years ago looked poor. Peoples and the governments behind them were unconvinced. Soldiers, who might have been expected to look favourably on even an expensive new instrument of reconnaissance, were loth to admit its possibilities or their belief in them. The Wrights like many another inventor, had to hawk their product, show its paces, declare their faith, and persuade the great to take a chance. In their own country they had to wait four full years for an order for one aeroplane from their government. And the contract was spattered with penalty clauses. Assuredly their official encouragement was slow to come and hard to win, but there was another form of encouragement, particularly in France and England, from those wild ones who in every generation respond to danger with courage and to progress with devotion. If there were few who wanted to back the aeronautical inventor, there were plenty who wanted to fly. They were to give the new art its vitality and its impetus.

Wilbur Wright had already perceived that the secrets of flying were to be revealed only by flying. "If you are looking for perfect safety" he had said, "you will do well to sit on a fence and watch the birds, but if you really wish to learn, you must mount a machine and become acquainted with its tricks by actual trial. The balancing of a gliding or flying machine is very simple in theory. It merely consists of causing the centre of pressure to coincide with the centre of gravity. But in actual practice, there seems to be an almost boundless incompatibility of temper which prevents their remaining peaceably together for a single instant." Even now, after fifty years, there can be no sitting on the fence or watching the birds from the office window of the designer. Those enthusiastic early pilots have given place to a class of test pilots whose task, complicated by technical and scientific development though it be, is still fundamentally to see that the centre of pressure and the centre of gravity are persuaded in all conditions of flight to coincide.

There was plenty of flying in Europe after the arrival of the Wrights in 1908. There had been some before but the movement gained strength when the Wrights arrived to give it an air of studious concentration and, among the crowd of pilots, the first of those who were to develop the aeroplane began to appear—the Farman brothers and Bleriot in France, A. V. Roe and Handley Page in England. The flying meetings of 1909 gave a further filip to the movement and in the following year T. O. M. Sopwith and Geoffrey de Havilland came into the game. The War Office also tried two Bristol aeroplanes with some success in manoeuvres. By this time there were prizes to win and the prospect of Government contracts. Flying schools were busy. Aircraft works began to appear

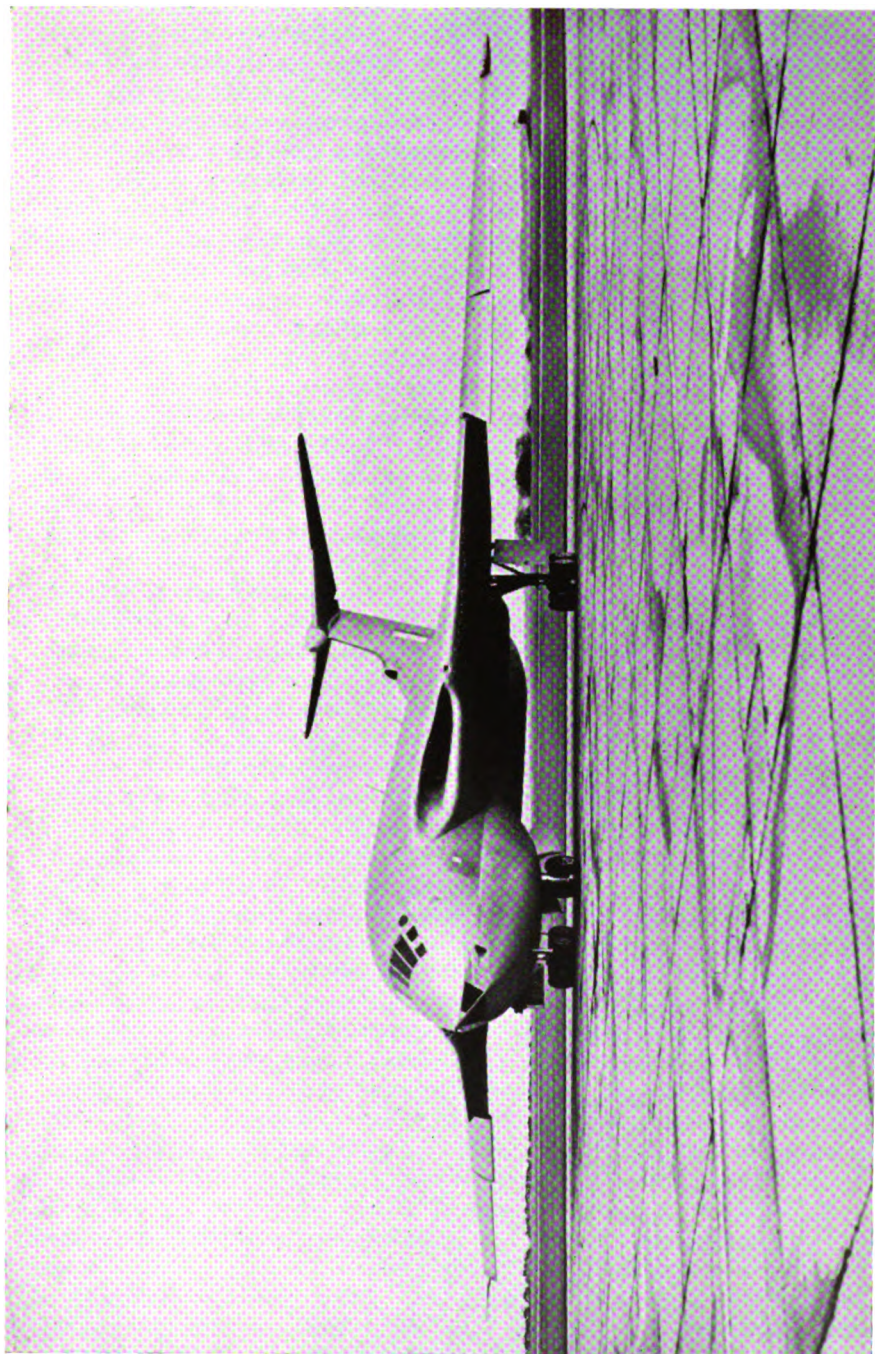


and by 1912 signs were to be seen both of an aircraft industry and of military aviation, for the War Office was buying aeroplanes.

Already, the need to find out many more things about flying and flying machines had impressed itself on the proponents. F. P. Raynham had got into a spin in cloud and had lived to tell the tale. That was in 1911 and it was probably the first example of a spin which did not end in a crash. In 1912 there were a number of monoplane wing failures in the air. For several years the monoplane was to be regarded with some suspicion and biplanes were to hold most of the field, although Louis Bleriot had seen quickly and acknowledged publicly the design slip which had given the monoplane its bad name. Insufficient provision had been made for the downward load on the wing in certain manoeuvres and particularly at the beginning of a dive. The prejudice against monoplanes was not to be overcome for more than a decade. Monoplanes were built and flown but Governments, the chief customers, fought shy of them and the war of 1914-18 was served almost exclusively by biplane types.

All the famous aircraft of the R.F.C. were biplanes—B.E.2, B.E.2C., R.E.8, Sopwith Pup and Camel, Nieuport Scout, S.E.5, Spad, D.H.2, D.H.4, D.H.9, D.H.9A., Bristol Fighter, and the Handley Pages. The monoplane had a most meagre representation in the Morane Parasol and Bullet (often mistaken in the air for the Fokker) and in the Bristol Monoplane. They were nearly all wood and fabric structures. Their engines were a mixed lot, some excellent if somewhat eccentric, some quite doubtful products of a developing industry and many of them needed a great deal of attention. The airframes had to be carefully rigged and generally re-rigged after aerobatics. For stability most of the types relied on setting the wings at a dihedral angle and even so, aircraft like the Camel needed to be flown all the time.

In the same period the seaplane was developed, mainly as a landplane on floats although the F.2A. flying-boat produced in England and the later America flying-boat of the United States set a style in hulls which lasted for fifteen years. The whole field of design was covered in those war years. There were plenty of ideas. There was scope for originality in conception and in methods of construction. Big orders were waiting for those who could offer a superior product and so, many things were tried that might otherwise have had to wait years for a chance. The Bristol Monoplane, for example, had an engine ring-cowling far ahead of its time; it had a tapered wing, an airscrew boss, and a well streamlined fuselage. The Hamble Baby had flaps. The famous Avro 504K. had a balanced rudder. Plywood was used instead of fabric for part of the fuselage of the D.H.4. How the credit should be apportioned is hard to tell at this distance. The cry for performance came incessantly from the pilots, particularly while the Air Staff were obsessed with the need of a clear field of vision and a good field of fire and with the desire for inherent stability even at the cost of manoeuvre. Out of that cry came the tractor airscrews of the B.E. and Sopwith series and of the D.H.5., and the more powerful engines like the Napier Lion that at last went into the D.H.9. and gave it a ceiling of more than 20,000 ft. Out of the pilot agitation came the Bristol Fighter which, when it appeared in 1917, had "less wings, wires and wood" than anything preceding it and yet had great strength to supplement its high performance. All through that war, the



Handley-Page Victor 4-jet Bomber



pilots were demanding a good aeroplane first and all the other good military qualities afterwards. They did the cause of flying fine service in thus insisting on good aerodynamics.

Others were looking after loads and working to secure long range. The big Handley Page bombers and the Vickers Vimy towards the end of that war were the first tokens both of serious air bombardment far behind the lines and of commercial possibilities. In these respects, the juvenile British aircraft industry was leading the world, for the United States was only beginning its own design of aircraft and Germany had yet to give the Junkers company its head. The single-seat fighter had arrived and established its function in many a dogfight. The principle of bombing the back areas had been accepted and, with the arrival of the D.H.9A, the idea of formation flying and the concentration of firepower for the defence of bomber formations had been adopted. The art of air warfare had emerged. It was still obstructed by the soldier's views of how it should be applied but experience had yielded a great body of evidence and justified certain solid conclusions which remain valid to-day. The subsequent development of the military aeroplane owes much to the conclusions drawn from that war. The theory of air warfare derives directly from its lessons. The beginnings of commercial air transport were to be found in some of its apparatus. Wilbur Wright's dogma that "if you wish to learn you must mount a machine" had been proved to the hilt by the Kaiser's war.

Until that war ended, little had been done or could have been done towards creating an air transport system. Small mail loads had been carried by air over short distances as demonstrations. Now the Peace Conference at Versailles was served by regular courier aircraft from England. On that service, the R.A.F. showed the world the beginnings of air transport as an additional means of communication. Civilians were quick to follow in the same path and the first regular flights between London and Paris began in 1919. These first operating companies used adapted war-time aircraft—chiefly de Havillands and Handley Pages. There was nothing else available. They were uneconomic. They were ill-equipped to meet the fog and low cloud and icing of European winter weather. They needed a lot of maintenance. Passenger fares and freight rates were high; and the public still looked on flying as a hazardous affair, well enough as an aid to military operations but too uncertain and unsafe for everyday purposes and too expensive for anything but a new experience or extremely urgent business deliveries.

Another form of civilian enterprise tended to keep the aeroplane in the stunt category. Joyriding concerns began to be started by ex-Service pilots who were anxious to go on flying. Their favourite aeroplane was the Avro 504K, bought cheap from the Government. It could work from small fields. It had no vices. It was relatively easy to maintain. It enabled the barnstormer to take up scores of people on short flights in the course of a day and, while the crowds of initiates queued for their turn, it yielded handsome profits. The same means of satisfying public curiosity spread over Europe and North America. It had little influence in turning people towards the incipient air lines but it no doubt served the end of making flying less a mystery and so began to create a public opinion favourable to the more serious development of air transport. For

nearly five years the operating companies limped along, handicapped by lack of funds and lack of suitable aircraft, discouraged by lack of profits and yet confirmed in their vision of a great future for air transport and increasingly vocal in their demand that the state should foster what would one day become an enormous State asset.

The aircraft industry was equally concerned. Its military market had virtually dried up. For its immediate future it had to look in part to export business and in part to the growth of the air-carrying trade. The bigger manufacturers were willing to apply some of their war-time profits to acquiring fresh fame for their products. Thus during 1919 bomber types were sent to Newfoundland to attempt the easterly crossing of the Atlantic and, when Alcock and Whitten Brown succeeded in their Vimy, Brackley in his big Handley Page was sent on demonstration flights in the United States. By carrying trade goods between some of the big cities, he certainly helped to awaken air transport enterprises in North America. Soon afterwards Ross and Keith Smith flew a Vimy from England to Australia. The era of record flights had begun. It was to last almost up to the outbreak of the next war in 1939, claiming many lives, yielding many splendid achievements and pointing always forward to the path which the commercial aeroplane might ultimately take.

Meanwhile there was stimulus along another line. Air racing had started even before the first war—at Rheims to begin with and then at Blackpool and Doncaster in 1909. By 1912 Jacques Schneider had given a challenge trophy for an international seaplane race. It was to develop into an occasion of rivalry among the nations and an opportunity to design for pure speed subject to certain simple basic seaworthiness requirements. Racing by landplanes did something to improve the breed but it had serious limitations. Landplanes had to use grass airfields and there were no concrete runways. Wing loadings were determined by the size of the airfields and, to some extent, by the nature of the undercarriage. The Schneider Trophy race released the designer from wing-loading disadvantages and invited him to pile on the power. If it had lasted longer, it would have forced him to arrive at the retractable float, which appeared only last year in the United States. Instead, the retractable undercarriage arrived first and with it, trailing-edge flaps which made Schneider speeds applicable to landplanes. By 1931, when the last Schneider race was flown, a British designer had obtained speeds which were not to be reproduced in landplanes until the Spitfire arrived six years later.

This was the romantic period in the development of the aeroplane. The enthusiasts were learning all that must belong to the running of an air line. The seekers after fame and prize-money were blazing trails. The designers were feeling their way to better performance, bigger loads, and more reliability. Governments were gradually being drawn in, first as controllers to safeguard their sovereign rights in the air above their territory and to protect their populations from damage and injury through air operations and secondly as sponsors of the new and struggling air transport industry. Principal airports became the responsibility of Governments; so did internationally-agreed rules governing air navigation, national standards of airworthiness and the provision of ground aids to navigation. Nearly everything else lay in the hands of private individuals, although one legacy of the war was the air research and

aircraft testing establishments, which remained to help in the general development of the emerging science of aerodynamics for peaceful as well as war-like ends. New things were appearing every year during this period; new ventures were being planned. Britain, in particular, had visions of shortening the links in a great empire and binding its scattered peoples still more closely through the speed of air transport.

That prospect drew the British Government into the air transport as a backer with nothing to gain but closer communications and the full organisation of air routes which might prove of the utmost strategic value if another war should afflict the Empire. In 1924 the Government agreed to subsidise commercial air transport, provided the four remaining operators would combine in one big company. On that understanding, Imperial Airways was formed and from that time until the Government-owned British Overseas Airways succeeded it in 1940, subsidy was paid to it on the basis of the horse-power hours flown. The R.A.F. was already following on the heels of the flying pioneers. It had made a plough furrow across the Iraqi desert as a guide to airmen. It was soon to begin periodical flights over the length of Africa as a preliminary to the creation of an air route to take the place of the project of Cecil Rhodes for a Cape-to-Cairo railway. It was to expand flying in India and extend it to Singapore. And always, behind the flying men in those days was the Government to arrange international agreements and encourage other Governments to spend money on airports. The revolution wrought by the Wright brothers in the world's communications system was clear to the intelligent by 1924. All that remained was to present its fruits and benefits to the people of the world. That process is still not complete but 30 years have seen it advance a long way.

Close association between makers and users of aircraft contributed notably in these early years to improvements and advances in military and civil aircraft. In Britain, Germany, the United States, and France, lessons learned on the air routes were built into the next generation of air liners and as the life of an average liner was four to five years, progress on this system was rapid and often exciting. Military aircraft went forward on a somewhat more certain system. The Air Staff prepared specifications, made their choice from competing designs and tenders, ordered a small number of the selected aircraft, and submitted these to a year's test in a squadron. On the result of that test depended modification and further orders. Both methods suffered from prejudices which the British found hard to overcome. While Germany, the United States, and the Netherlands were turning confidently to the monoplane, Britain persisted with the biplane. British distrust of the monoplane had its compensations for it did lead to some supremely comfortable big aircraft like the four-engined H.P.42 which could boast Pullman standards. They had to be paid for; and Imperial Airways found itself competing on routes to the East at 90 m.p.h. with the Fokker monoplane of K.L.M. at 150 m.p.h. and afterwards with the D.C.-3 at 180 m.p.h.

While this prejudice persisted, there could be no compulsion towards retractable undercarriages (because there was no space in the thin wings to contain them) or towards flaps (because landing speeds could be kept low). With low wing-loading, there was no need later to embark on variable-speed airscrews. These elements in progress were forced on



Britain by competition from abroad. And yet in one respect, the British did remarkably well, they took to building flying-boats at an early stage and continued right up to the outbreak of war to build craft in this class which were efficient on the water and in the air. For the last five of the inter-war years, they rested their Empire airmail system and their maritime reconnaissance service on fleets of excellent flying-boats, and just before war broke out Imperial Airways had made, with flying-boats, the first trials on the route between Europe and North America. While the British resisted the monoplane, they also did well with military aircraft. They were helped by a series of fine engines both air-cooled and water-cooled. Plenty of ingenuity was exercised in getting rid of struts and bracing wires between the wings and in reducing all other kinds of drag. When all had been done that could be done in these respects, the biplane was seen to have had its day and the monoplane was accepted with the various drag-saving devices it offered.

Lagging behind in monoplane enterprise, Britain had virtually lost the airliner market to the United States. That did not seriously worry the manufacturers; a rearmament programme was in sight and the demand now was for military monoplanes. For fighters, there was the experience of Schneider racers to draw on. For bombers, there was much experience in big biplanes and some knowledge of monoplane construction derived from Fokker liners built under licence, from the big monoplane flying-boats and from private effort in monoplane construction by the Bristol, de Havilland and Fairey companies. The race for high performance had begun again—high speed, high rate of climb, high ceiling, and good control at height for the fighters; big loads, good range, relatively high speed, a good ceiling, and good powers of self-defence for the bombers. All the aids were now in use. Concrete runways began to be laid and higher landing speeds became permissible. Wing-loadings could be increased, subject to the limitation of the landing run. The cry became one for more power. The fighters had to meet the Messerschmitts and then the Focke-Wulfs; height became as important as speed. The big bombers were required to carry bigger and bigger bombs; they were opposed by intense A.A. fire and they had to cope with fighters. Among the fighters, the Hurricane reached the limit of its capacity to absorb more power much earlier than the Spitfire. The Spitfire was in continuous modification and development for five years and, at the end, could still have taken more power than it got. At least one Spitfire, diving with full power, approached the speed of sound although its maximum level speed was only around 425 m.p.h.

Signs of a new complication had appeared in these years. With increasing power from engines there had arisen some difficulty in converting power into thrust. As rates of revolution rose, there was the danger that the tips of airscrew blades would be moving at supersonic speeds and so would encounter airflow conditions about which the aerodynamicists knew little. Gears to combine high engine speeds with comparatively low airscrew speeds were only a palliative and changes in the shape of blades were successful only up to a point. For the next step forward, a radical development was needed. In Germany, Italy, and Britain at about the same time, some attention began to be given to reaction propulsion, based on the same principle as the recoil of a gun. During the late

1920s work on jet propulsion moved slowly in private hands, backed by too little capital and supported in official quarters by too little faith. Then in the middle 1930s, Frank Whittle, a junior officer in the R.A.F., obtained government support which set his work moving at a much faster rate and the promise of useful results appeared. By 1941 a British jet aeroplane using a Whittle gas turbine was flying. With that success, the British had once again stepped right to the front in flying affairs. Germany had neglected the gas turbine so that work might be concentrated on rocket propulsion; Italy had let the gas turbine fall into the background; Switzerland had applied it only to industrial purposes; the United States had seemed oblivious of its promise. That first British specimen was no immediate threat to the piston engine and its conventional airscrew but its possibilities could not be ignored and the effort to realise them at once became intense.

As part of Allied co-operation, the gas turbine of 1941 was presented, together with all relevant information, to the United States. From that point, gas turbine work might have been expected to march side by side in Britain and the United States. In fact the British, aiming solely at aircraft of practical military value and seeking the best compromise between high power, duration, and long life, found themselves at the end of the war with the finest jet aircraft in the world and an advantage in gas turbines which surprised them. The jet had played little part in the war. In the closing stages a few R.A.F. squadrons had been equipped with jet fighters of a top speed near 500 m.p.h. but they barely succeeded in testing their powers against German fighters. Meanwhile, the jet engine continued to be improved with typically British unspectacular steadiness and the performance of those same war-time fighters gradually improved until a world's speed record of 618 m.p.h. was made by one of them in 1946. In the temperatures of Northern Europe, that was evidently about the limit of the Meteor. The significance of the Mach number had been demonstrated and the hurdle of the "sonic barrier" appeared quite formidable. Peace and reconstruction in Britain led to a deceleration in aeronautical progress except for persistent attention to the jet engine and enthusiastic consideration of its possible use in civil flying. In theory that was fantastic, romantic, impractical, and uneconomic.

Did not the jet aeroplane need to fly high for best results? Was not the jet engine extremely extravagant in fuel consumption? How could high operating speeds in jet liners be fitted into a traffic pattern based on much lower speeds? What of engine life and the economics of maintenance with turbine blades costing £4 each? Could a navigator on a long run keep pace with this high aircraft speed? How could you cope with waiting for a turn to land in an aeroplane eating up five times as much fuel at 3,000 ft. as it required at 40,000 ft.? The idea of the jet liner was almost summarily dismissed by the Americans when, from 1948, the British were known to have embarked on it. The jet bomber received more attention in the United States and so did the jet fighter but the American attitude still differed from the British. The Americans, impatient to make full-scale investigation of supersonic speeds, substituted rockets for gas turbines in experimental aircraft, had these short-duration aircraft launched from carrier aircraft at great height and pushed on far into the realm of supersonic speeds. The British plodded on with true jet aircraft, gradually raising the power of their gas turbines and arriving



ultimately at the supersonic fighter without sacrificing duration and those other qualities which are valuable in a fighter. In 1953, Britain's gas turbines were still the best in the world; her new fighter aircraft were approaching squadron service; a new generation of medium jet bombers was in production; her first jet liners were in service on several air routes; and another new class of liners using gas turbines to drive their airscrews was beginning operations.

Cruising speeds for the jet liners were about 500 m.p.h. For the turbo-prop liners they were between 300 and 375 m.p.h. Speeds of the new fighters and bombers were not disclosed; they were presumed to be from 600 m.p.h. upwards. Moving on towards speeds beyond the speed of sound, the aerodynamicists faced a whole new category of difficulties associated with control, construction, the behaviour of materials at high temperature, design, height, and so forth. These were seen to be military matters for the present. Air transport would not be concerned with them for some years. Air transport had plenty to occupy it in applying jet propulsion and the benefits of the turbo-prop to its needs, regarding the jet as the instrument of long range and high speed, and the turbo-prop as suited to speeds below 500 m.p.h. and to stages up to about 1,200 miles. Britain's introduction of these new types of aircraft to the air routes in 1952-3 was a triumphant justification of the steady work and high vision of one set of inheritors of the Wright tradition, tackling their more complicated tasks in the sober, tenacious, and yet courageous fashion of the Wright brothers themselves. To match that modest and yet courageous success there are similar successes on the military side, with fighters which have exceeded Mach 1.0 in level flight and yet have retained the practical characteristics of fighters. In the United States, experimental aircraft rocket-driven have flown at Mach 2.5 but in the squadrons of the U.S.A.F. the best fighters still have a Mach number below 1.0.

What is clear nevertheless is that 50 years of flying have brought the world to the threshold of a new defiance of nature's laws. Ways are now being found to deal with the air when it ceases to flow like a docile liquid and breaks up into shock waves with strange effects in awkward changes of pressure and undesired changes of temperature. A new sphere of research has opened and will occupy generations to come. In the same period, flying has presented the world with the boon of fast, comfortable, and reasonably safe transport and has brought its price continuously nearer that which the world's economy can afford to pay. It has also confronted the world with an aid to destruction, which mankind will misuse at its peril. Until war is replaced by other final means of settling disputes, mankind equally can not afford to neglect this new instrument of war. The prospect is that it will therefore march on through the "sonic barrier", leaving recurrent legacies to commercial air transport such as could not be afforded by that industry out of its own earnings. The Wright brothers might perhaps be satisfied with this first fifty years of progress. Their spirit has invaded a multitude; their ways of establishing scientific facts have been followed with flattering fidelity; their advice not to sit on the fence and watch the birds has been gladly, gaily accepted; and out of their humble, hesitant beginnings has grown a new arm in warfare and a new technique of transport. Their disciples have indeed been worthy.

E. COLSTON SHEPHERD

## CHAPTER XXVII

### THE CHANGING PATTERN OF THE ROYAL AIR FORCE

BY AIR VICE-MARSHAL W. M. YOOL

#### THE BACKGROUND TO THE DEFENCE PROGRAMME

WHEN THE £4,700 million defence programme was announced in 1950, the expenditure was to have been spread over three years. This period has had to be extended progressively, partly because the original programme was found to place too great a strain on our economic resources, and partly because it was found to be beyond our industrial capacity to complete the programme within three years. A slowing down of the programme was therefore announced last year, and the Defence Estimates for 1953/54 reveal that there has been a further slowing down of the original programme, but even so the estimates represent a substantial increase of some £123 million over the expenditure for 1952/53, or of some £78 million if counterpart funds received from the United States are excluded.

As far as the Royal Air Force is concerned the estimate is for £548 million, including £50 million counterpart funds, out of the total defence estimates of £1,637 million. This represents an increase of 180 million over the expenditure on the Air Force in 1952/53. The strength of the Royal Air Force has increased from 271,000 in April, 1952, to 279,000 in April, 1953, but on present plans there will be no further increase during the present year, and there may be a slight reduction by April, 1954.

The fact that there was likely to be a further slowing down of the defence programme was first foreshadowed in the announcement made by the Prime Minister in the House of Commons on December 4, 1952, when he announced that the expenditure on defence production would be reduced in 1953/54 to some £600 million, compared with a figure of £800 million in the original plan.

So far as possible the curtailment of the earlier production plans is to be brought about by spreading deliveries over a longer period, but at the same time we are accelerating the production of the latest types of equipment. To achieve this, super-priority has been granted to certain types of aircraft and other items, and this has inevitably meant that the production of some of the older items of equipment has had to be reduced, as has been done in the case of the Canberra bomber and the older types of fighters.

The retardation of the defence programme has not involved any reduction in the striking power of the Royal Air Force, and there has in fact been an increase in this respect. During the past few years much of the effort has had to be concentrated upon the provision of new and improved airfields, and on the training organisation necessary to match the first line strength. The peak of the airfield construction programme has now been passed and the training organisation is also beginning to contract, because the spreading of deliveries of aircraft over a long period means that fewer aircrew will need to be trained than under previous plans. The reduction in aircrew is being made chiefly in the National Service entrants, as they

can give little or no productive service owing to the length of time it takes to train aircrew.

Consequently it is possible to devote the increase in expenditure during the present year mainly to the provision of new types of aircraft and their equipment, and as a result there will be a further expansion of the first line strength, both in numbers and in striking power, even though there has been a slowing down of the rate of expansion.

At the same time as we are pressing on with the development and production of new bombers and fighters it has become evident that, apart from the fact that our economy cannot continue to stand the strain of expenditure on armaments on the same scale as over the past few years, it would be unwise to base our strategy solely on conventional air weapons. The development of guided weapons during the next few years may well alter materially the role of the Royal Air Force, and the fighter might become out of date as a defensive weapon. This day is not in sight yet, but the development of the guided weapon is an expensive process, which has put a further strain on our economy.

Nevertheless it is essential that money should be spent on "push-button" warfare, as we cannot take the risk that development of this form of warfare in other countries might eventually make our own Air Force out of date. We have therefore to strike a balance between our expenditure on research and development in the guided weapon field, and on the Air Force in its existing pattern. Obviously, however, this expenditure on guided weapons means that there is less money available for the development and production of new types of aircraft.

#### DEFENCE REQUIREMENTS

There has been little or no change during the past year in the main defence requirements to be fulfilled in war by the three services. These are the defence of the United Kingdom, the safeguarding of the sea routes, the protection of our own interests and those of the Commonwealth overseas, and our contribution to the defence of Europe under the Brussels and Atlantic Treaties. In all of these the Royal Air Force has to play its part, and while the various requirements are to some extent complementary there remains the risk that we may dissipate our resources by attempting too much. An instance of this is the demands that are being made at the time of writing for this country to make a contribution to the European Defence Community. Whatever the eventual outcome of these discussions may be there is obviously a definite danger that any undertaking to place still more of our forces under international control may lead to duplication, as such forces must necessarily be additional to those we regard as essential for our own defence, and which we must therefore keep under our own control.

Although the requirements to be fulfilled by the services in war remain broadly the same, there does appear to have been an important alteration in the shape of our forces in that we seem now to be planning primarily for a short war. A leading article in *The Times* of February 20, 1953, contained the following extract,

The Chiefs of Staff are nowadays compelled to forge an instrument which can play any of four possible and conflicting roles. There is the cold war, with its specially heavy burden for the Army in Germany and the Middle East and its active operations for all three services in the Far Eastern theatre,

there is the supremely important task of keeping, and when necessary displaying, a large enough force of fighting men of all arms and trades to deter any possible aggressor from malicious experiments which could lead to general war. The third requirement must be with an eye towards the first 30 days of a full-scale modern war, should such a catastrophe be forced upon the world by the Communists; in this period both sides would fight with their most terrible weapons, vainly hoping to snatch quick victory in the teeth of hideous reprisals. Finally, there is the sequel to such an overture, the long months and years that could follow D plus 30, when exhaustion had possibly set in and the tempo had to slacken for a breathing-space and a more old fashioned mode of fighting.

Planning for a war on these lines has, in fact, been imposed upon us by the need for economy. It is very doubtful whether even the United States, in view of the ever increasing cost of modern armaments, could possibly afford to build up and maintain in peacetime the forces necessary to fight a long war on the scale now envisaged for the opening stages. It is clear that this country could certainly not afford it, and it seems inevitable therefore that if war does come, and it is not won or lost in the first few weeks, a period of exhaustion on both sides may then supervene, to be followed by a gradual building up process for a renewal of the struggle.

Fortunately, as far as the Air Force is concerned, there have not been the same calls as in previous years to meet the needs of the cold war. The shortage of transport aircraft, which have been urgently required at various times in the past to move troops urgently to such areas as Malaya, Iraq (in connection with the Persian crisis), and Egypt, has therefore not been felt to such an extent. Troops were moved, however, during 1952 in comparatively small numbers to Kenya, but the reductions originally imposed on Transport Command in 1950 have continued in force, and we continue to rely, as heretofore, on civil aircraft to supplement our air transport resources. Although civil aircraft are themselves inadequate in numbers, Transport Command cannot be increased because of the overriding necessity to increase the striking power of the Force. The only way therefore by which this need can be met is by an expansion of our civil transport resources, so that in an emergency they can be used for military purposes. There has been a slow but gradual improvement in this respect, but the number of civil aircraft is still far below what we should need in war, or in another major emergency in the cold war, such as the Berlin air lift or the trouble in Egypt. As long as the production of military aircraft has to continue on the present scale, there can be no very great increase in the rate of production of civil aircraft, however, as any substantial increase could only be at the expense of production for the Air Force.

#### EXPANSION AND RE-EQUIPMENT

The expansion of the Royal Air Force has continued throughout 1952. New squadrons were formed in all Commands, and there was an increase of one third in the flying hours compared with 1951. At the same time a large scale re-equipment with new aircraft has taken place. In Fighter Command all the night fighter squadrons have received two-seat radar equipped jet fighters, and the night fighters overseas have been similarly re-armed. Coastal Command has received Neptunes and Shackletons to replace the wartime Lancasters, while Flying Training Command has

introduced Vampire jet trainers, Varsitys, Valettas and Balliols in various training roles.

The greatest expansion in any one Command during the year has been in the 2nd Allied Tactical Air Force, where the Royal Air Force, under the Supreme Allied Commander in Europe, is now directly associated with the squadrons of the Belgian and Netherlands Air Forces. During the year the Command started to receive Venom fighter-bombers, which have a performance greatly superior to that of the Vampires, and the first swept-wing Sabres, manufactured in Canada and destined for 2nd T.A.F., arrived during December, and many more will arrive during the present year.

The most marked change, however, was in Bomber Command, where the introduction of the Canberra on an increasing scale has virtually doubled the speed and height of bomber operations, and will enable valuable experience to be gained in the operation of jet bombers pending the forthcoming introduction of the three long range jet bombers, the Valiant, Victor, and Vulcan, now in "super-priority" production for the Royal Air Force.

"Super-priority" was also given to the Swift and Hunter day jet fighters, and to the Javelin jet all-weather fighter, as part of the continuous process of modernising our fighter force. The pre-war fighters were overtaken by the Hurricane and Spitfire, which were replaced by the Meteor and Vampire. Now it is the turn of the Swift, Hunter, and Javelin, but so rapid is the process of development that it is probable that, before they are forthcoming in any numbers, new fighters will be in the design stage that will render them out of date. The introduction of these new fighters, such as the Swift and Hunter, does not, however, involve any change in the policy for Fighter Command, but is only another stage in the re-equipment of the fighter force with up-to-date aircraft.

The first of the new fighters to reach Fighter Command will be the Swift, some of which should be in service during the present year. To bridge the gap until the Swift and the other new fighters are available in quantity, a number of F.86 Sabre aircraft are to be provided for Fighter Command under the United States Mutual Security Programme, and these will be additional to the Sabres already being made available for the 2nd Tactical Air Force.

The fact that "super-priority" has also been given for the production of the Valiant, Victor, and Vulcan long range bombers does, however, foreshadow an important change in the role of our bomber force. Since the war Bomber Command has been equipped first with the Lancaster, which was our major bombing weapon during the war, and latterly with the Lincoln, which was a modified version of the Lancaster. The fact that these aircraft, when opposed by modern jet fighters, were only suitable in the main for operation by night, together with their limited range compared with the long range bomber necessary for strategic bombing to-day, meant that our bomber force was only suitable for tactical operations under modern conditions.

The introduction of the Canberra, although it had a vastly improved performance compared with the old piston engined aircraft, has not altered the role of our bomber force, and it is still more suitable for the tactical rather than the strategic role. The picture will be very different, however,

when once the new long range bombers become available, as we shall then have the most efficient and up-to-date bomber force in the world, capable of delivering atomic or other bombs to any point on the globe.

It has been stated in various quarters that the provision of these new bomber aircraft is an expensive luxury that we cannot afford, and that even if the introduction of long range bombers is necessary for our defence, there is no need to produce three different types, as it would be more economical to concentrate production on one type only.

As regards the first point it is argued that, as the United States has built up a powerful strategic bomber force, there is no need for the other countries in the North Atlantic Treaty Organisation, and for this country in particular, to build up a duplicate force. This ignores the fact that under the North Atlantic Treaty the parties to the Treaty are not necessarily bound to come to each other's assistance with armed force. Article 5 of the Treaty only binds each party to take "such action as it deems necessary, including the use of armed force, to restore and maintain the security of the North Atlantic area."

It is therefore clear that we cannot necessarily rely on the other signatories taking action under the Treaty to come to our assistance, and that even if they so decide there may be some delay. We should therefore be most unwise not to retain under our own control such forces as are necessary for our defence, should we have, unaided, to defend ourselves against aggression. In spite of the provisions of the North Atlantic and other Treaties the possibility cannot be ruled out that future developments in international relations might result in our having to defend ourselves without the assistance of other countries, and in this event a long range bomber force will be an essential element in our defence.

Furthermore, if we are to retain our position amongst the great nations of the world, we must have the means to defend ourselves without having to rely on other countries. If we do not do this, we shall eventually sink to the status of a third class power, and the long range bomber today occupies much the same place in our defence forces as the Dreadnought occupied in the early years of this century in the face of the rising might of Germany. In those days the slogan was, "We want eight and we won't wait", and much the same considerations apply to the provision of the long range atomic bomber today.

The words used by Mr. Churchill in his speech at Boston in 1949 apply with even more force today, "For good or ill, air mastery is today the supreme expression of military power and Fleets and Armies, however necessary, must accept a subordinate rank." If we are to hold our own amongst the great powers, and influence effectively the direction of allied strategy, we must possess the means of retaining the mastery of the air, of which the long range bomber is so essential an element.

There remains the criticism that even if long range bombers are necessary, it is extravagant and inefficient to develop three different types, and that it would be better to concentrate on one type only. There is certainly force in this criticism, as it will cost more to develop three types simultaneously than one. Against that, however, it must be remembered that we are as yet only in the infancy of the jet age. The three new bombers, the Valiant, Vulcan, and Victor, although designed to fulfill the same role, are radically different in their design. The Vickers Valiant has swept

back wings and tail surfaces, the Avro Vulcan has the "delta" wing, and the last of the trio to be produced, the Handley Page Victor, has a crescent (or scimitar) wing which is said to combine the advantages of the delta, swept and razor-thin straight wings without their drawbacks.

Until experience has been gained with these three types under operating conditions we cannot be sure in the light of present day knowledge which of these three aircraft is likely to prove the most efficient, and best suited to further development. One of the three may well prove to be so much better than the others that we should have lagged seriously behindhand had it not been developed.

A similar situation existed at the beginning of the last war, when we also had three types of heavy bomber under development, the Halifax, Lancaster, and Stirling. Production of all three was continued until experience under operational conditions showed that the Lancaster was the best of the three, and production of the other two types was eventually suspended, but it could not have been foretold in advance that the Lancaster was going to prove so superior. In the long run we may therefore economise by developing three types of aircraft simultaneously, even though development may cost more in the early stages, as in the end we shall be able to concentrate on the most efficient aircraft.

#### MANNING

The improvement in the manning situation which was reported last year has continued, and the men have been forthcoming much in the numbers required. This has been due in the main to the popularity of the short engagement scheme, which was particularly successful in attracting the National Service man. Of these about 25,000, or about 46% of the National Service entry transferred to regular engagements.

We are still not succeeding, however, in attracting in sufficient numbers the long service men, from whom come the senior N.C.O's. and highly skilled tradesmen, who are the backbone of the force. In particular there are serious deficiencies of advanced tradesmen in the aircraft, radio, armament, and electrical and instrument engineering trade groups, which are the most essential trades to support the flying effort. In order to make good these deficiencies to some extent, advanced training is being given to a number of men on short engagements and to some National Service men, but this is an uneconomical way of meeting the deficiencies, owing to the short period of productive service that can be obtained from such men, and it does not help materially to solve the long service problem.

The recruiting of aircrew has been reasonably satisfactory, and the reduction in the training organisation means that fewer men will be required in the future. It should therefore be possible to raise the standard still further, which would have had to be done in any event to meet the higher requirements of the new types of fighters and bombers coming into the service during the next few years. One respect in which recruiting has not been entirely satisfactory is that candidates of the right type have not been coming forward in sufficient numbers for Cranwell, and as a result all the vacancies for cadetships have not been filled, as the Air Ministry policy is that no lowering of the standard can be accepted.

There have been changes during the past year in the policy for reserves,

and these changes are described in detail elsewhere in this volume. In the main the changes are designed to effect economies in the cost of the reserve forces by reducing their numbers, and to improve the efficiency of the reserves who are retained.

### FUTURE DEVELOPMENTS

The past year has seen the greatest alteration in the pattern of the Royal Air Force since the war. The first few years were necessarily devoted to dealing with the problems of demobilisation and restoring some stability to the force, whilst at the same time reducing it in size. But the invasion of Korea in 1950 put an end to the progressive reductions in the armed forces, and the Air Force, in common with the Army and Navy, had to reverse this process and start on a programme of expansion.

At first this expansion was one of numbers, both of aircraft and men, rather than quality, pending the production of the new types of aircraft that were then only in the experimental stage. As the expansion progressed however, it became evident that the cost of re-equipping the force with the latest types of aircraft was going to be so great as to place too great a strain on our economy unless savings could be made in other directions.

The Government therefore decided that for the next year or two until the new types could be put into full production, the production of the aircraft with which the Force is at present equipped would be curtailed, as the latest developments had rendered them obsolescent, and that we would concentrate on building up the Force with the latest types of aircraft. This means that eventually not only will our fighter force be equipped with the best fighter aircraft in the world, but even more important, that we shall once more have a powerful bombing force, second to none in range and striking power.

Hitherto there has been some doubt whether we should be justified in developing the long range bomber alongside the United States. As pointed out earlier in this article this doubt has now been resolved, and when the re-equipment of the Royal Air Force has been completed we shall have a force which, though numerically smaller, will be infinitely more effective in defence, and incomparably stronger in attack.

W. M. YOOL



## CHAPTER XXVIII

### TRAINING IN THE ROYAL AIR FORCE

BY WING COMMANDER J. A. HOLMES

THE AIM of Royal Air Force training is threefold: to produce highly qualified aircrew capable of applying the striking power of modern aircraft, to develop the technical skill of groundcrew, and to ensure that commanders and air staff officers are not only fully aware of the capabilities of current aircraft and weapons but also thoroughly understand the principles and operational techniques by which they can be most effectively employed in air warfare.

These requirements have been fundamental to training policy since the Royal Air Force was formed in 1918. Between the wars their fulfilment was relatively straightforward. Aircraft were simple to fly and maintain, while competition was keen amongst candidates for aircrew duties in a comparatively small service. To-day the picture is different. Modern aircraft are complex and expensive weapons. Progress in performance and striking power has not been matched by greater simplicity in design, handling, or maintenance so that greater demands are made on the skill and ability of aircrew and groundcrew alike. At the same time the expansion of the Royal Air Force to meet defence requirements has made exacting demands on the youth of the nation to provide aircrew for the first line squadrons. High standards of character and intelligence are essential. Sufficient young men with these qualities are not easy to find for the other services and industry must all take their fair share.

Despite the urgent need for large numbers of aircrew the temptation to cast a wider net by accepting lower standards has been successfully resisted. The training organisation has however been streamlined to increase turnover and output during the critical period of the expansion. The steady re-equipment of front line squadrons of Bomber and Fighter Commands and the 2nd Tactical Air Force with jet aircraft has also raised many problems for the Royal Air Force Training Organisation. It is well known that jet aircraft fly faster and higher than their piston engined counterparts but, quite apart from the higher performance conferred by a more powerful prime mover, propulsion by jet in place of the propeller has brought fundamental changes to the technique of flying. Knowledge and mastery of these techniques must be given to aircrew at the earliest practicable stage in their flying careers so that they may graduate with confidence to the most advanced operational aircraft. At present pilots convert to jet aircraft after 180 hours on piston engined aircraft. This is not nearly soon enough. The large majority of jet aircraft coming off production have been urgently needed to build up the Operational Commands but, with the expansion of the aircraft industry, more jet aircraft designed for dual training are becoming available and plans to introduce jet training at an earlier stage have been a major factor of flying training policy in 1952.

Despite the special problems of rapid expansion; the administrative load involved in the formation of many new units of all types, and the

pressing need to re-orientate training to meet the needs of an all jet air force, the training organisation has in the main successfully broken the back of its task during the past year. The fact that the training programme has been accomplished without any major dislocation of effort speaks well for the flexibility of sequence and organisation within the responsible Commands. Part of the task, in particular the basic training of pilots and navigators has of course been undertaken by civil flying schools operating under the control of R.A.F., Home Command, while the Royal Canadian Air Force has generously provided aircrew training capacity from its own growing resources.

During the year the peak of expansion has been passed and there are signs that the burden on the Training Organisation will decline during 1953. Now that the most critical phase has gone by it has been possible for training patterns to be reviewed and the trend, which will be discussed later in the article, is for course lengths to be extended.

### FLYING TRAINING

The sequence of flying training in use during 1952 is shown graphically in the diagram (page 337). This covers all aircrew categories and shows the stages at which pilots and navigators are joined by signallers, engineers, and gunners, to form complete crews. All volunteers for aircrew, other than Cranwell cadets, whether for Regular or National Service are first interviewed by the Aircrew Selection Board at Hornchurch. Candidates between the age limits of  $17\frac{1}{2}$  to 26 years undergo a series of intelligence, educational, and aptitude tests from which their suitability for the various aircrew roles can be assessed. While the aptitude tests cannot predict with certainty which candidates will make successful service pilots, they can be relied on to select those who have a good chance of becoming pilots from those who have small aptitude for flying. Quite frequently candidates who make a poor showing on pilot aptitude tests have very good academic qualifications and are entirely suitable for navigation training. Others may be accepted for training as Signallers, Engineers, or Gunners.

Pilots and Navigators accepted for training by the Selection Board receive a course of initial training lasting 18 weeks. Recruits are drawn from all walks of life; some from previous civil employment; others direct from school so that initial training is mainly designed to provide a sound knowledge of service methods, and discipline, and to develop physical fitness and initiative. All cadet pupils who successfully pass their initial training are commissioned as Acting Pilot Officers on probation.

After initial training Regular entry pilots carry out their flying training at Royal Air Force Training Schools. During 1952 this entailed a nine months course including 60 hours basic instruction on the Percival Prentice and 120 hours applied instruction on the Harvard aircraft. In the Rhodesian Training Group basic instruction is given on the De Havilland Chipmunk while in Canada pupils take the air in Harvard aircraft from the very outset of their flying training. National Service pilots carry out a very similar programme but the majority receive their 60 hours basic flying instruction at Civil schools on Chipmunk aircraft and undergo advanced instruction on the Oxford at R.A.F. schools. Five Civil basic flying schools have been operating during 1952 at Booker, Ansty, Derby,

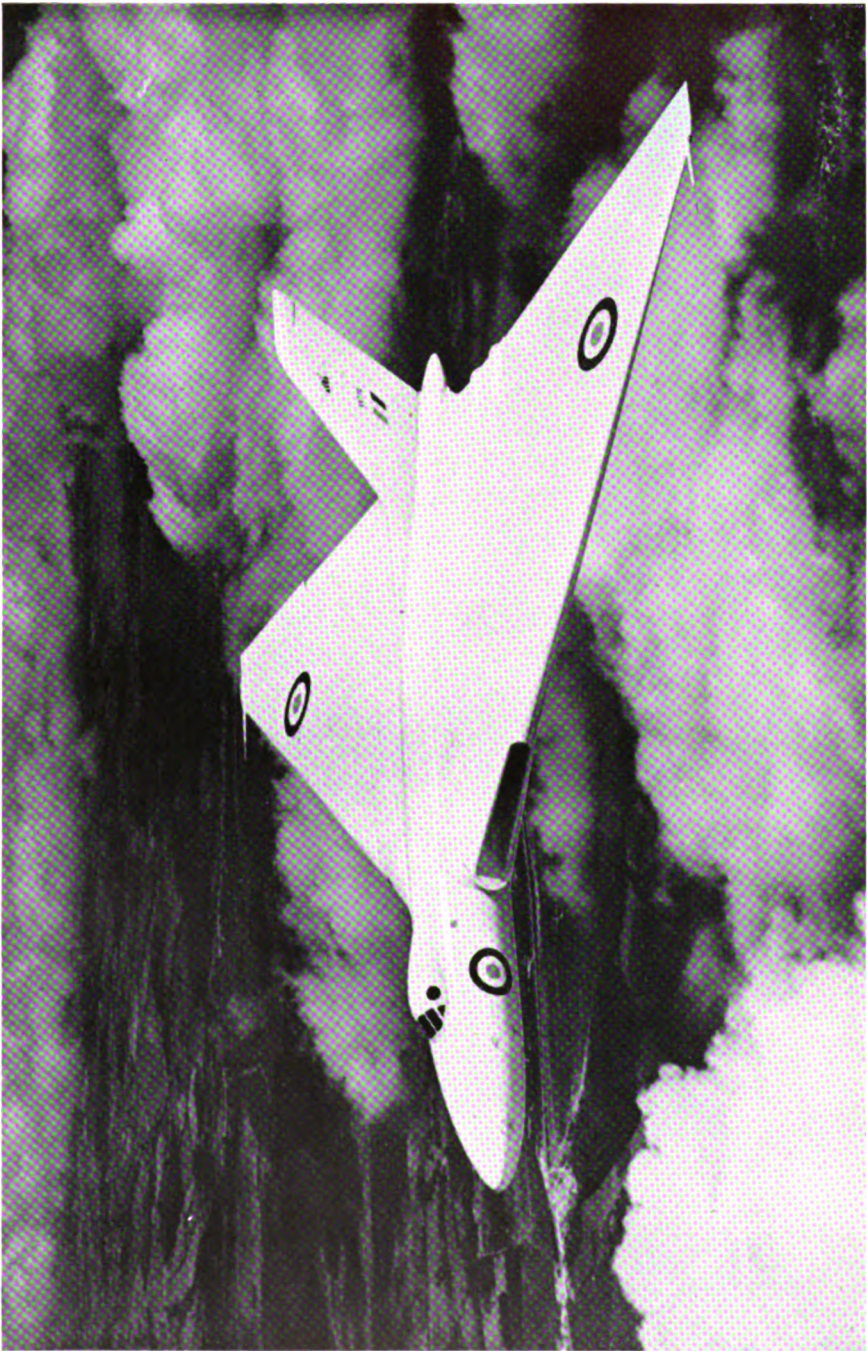
Sywell, and Desford under the operational control of R.A.F. Home Command.

The aim at the Flying Training Schools is to ensure that pupil pilots gain full mastery over their aircraft in all conditions of flight and acquire a thorough knowledge of those aeronautical subjects which are an essential background to good pilotage. The flying syllabus covers general flying, full range of aerobatics, instrument and night flying, navigation, and formation practice. Ground subjects include Aerodynamics, Meteorology, Engines and Airframes, Navigation, and Airmanship. In addition emphasis is placed on physical fitness, leadership, and survival training. The young officer on probation naturally has much to learn about the service way of life and methods so that opportunities are provided for him to develop his powers of initiative, responsibility, and organisation. In mess life and daily routine the senior pupils are encouraged to run their own show, on similar lines to the well tried system at Cranwell.

At present the "Wings" flying badge is awarded to successful pupils at the end of the course at Flying Training School by which time 180 hours flying has been completed on piston engined aircraft. Pilots trained in Rhodesia and Canada take an additional course of 6 weeks at Flying Training Schools in the United Kingdom to gain experience of flying in English weather conditions. Flying training, however, is by no means ended. The next stage takes place at the Advanced Flying Schools. At these schools training begins to be selective. Pupils destined for day fighters carry out 50 hours flying in 14 weeks on Meteors or Vampires, while those pre-selected at F.T.S. for the night fighter or jet bomber role go to "all weather" Advanced Flying Schools for an 18 weeks course involving 60 hours on Meteors. At the "all weather" schools the syllabus features a large proportion of night and instrument flying whereas the emphasis at "day fighter" schools is placed on aerobatics and formation flying.

No. 201 Advanced Flying School, Swinderby, is charged with the training of pilots who will fly piston engined aircraft in Bomber, Coastal, and Transport Commands. Here pilots complete 60 hours on the Vickers Varsity on a course of 10 weeks duration. At No. 201 A.F.S. pilots, navigators, and signallers come together for the first time and gain experience of flying together as a team. A typical crew complement for the Varsity is a flying instructor and pupil pilot, a signals instructor and pupil, and a navigation instructor with two pupils. Reflecting the policy for flying courses to be extended a longer course providing increased flying hours was introduced at all Advanced Flying Schools in January, 1953.

Up to the completion of the course at Advanced Flying Schools all pupil pilots, and navigators, have been under the wing of Flying Training Command and its various Group Headquarters. Their time has been devoted to gaining mastery of their aircraft; they have yet to learn how to use an operational aircraft as a weapon in the specific roles of the Operational Commands. Unlike the United States Air Force in which "combat" training is vested in the Central Air Training Command, operational training in the Royal Air Force is conducted under the direct control of the individual operational commands through the medium of Operational Conversion Units (O.C.U.s). These units are staffed largely with pilots



Avro Vulcan 4-jet Bomber



from front line squadrons, whose first hand experience is invaluable for training pupils in their future role. A leavening of qualified flying instructors helps to ensure that flying standards are maintained. O.C.U. courses vary widely in duration, number of flying hours, and type of training. Ranging from a course of 30 hours in 8 weeks at Day Fighter O.C.U.s where weapon training, gunnery practice, and fighter tactics are the main features, to a course of 105 hours in 11 weeks at the Coastal Command O.C.U.s where training in general maritime reconnaissance and anti-submarine operational techniques follow conversion to the heavy long range Shackletons and Neptunes of the maritime air forces. The greatest expansion has taken place in the fighter O.C.U.s in order to supply pilots for the rapid build up of Fighter Command and the 2nd Tactical Air Force thereby making available to the Supreme Commander Allied Powers Europe a strong British contribution to the integrated air force for the defence of Western Europe.

The pattern of pilot training through the F.T.S., A.F.S., and O.C.U. is closely duplicated for navigators who pass from initial training to the Air Navigation Schools where they receive 63 hours basic instruction in Anson aircraft and 40 hours basic on Valettas, followed by 94 hours applied instruction in the Valetta and Varsity. Beginning with simple navigational flights to provide a thorough understanding of the basic principles of Dead Reckoning, the pupil navigators gradually tackle more advanced air work involving the use of all modern aids to navigation by day and night on long distance exercises. The syllabus includes location of set targets, and the practice of bombing technique by day and night. Navigators are awarded the flying badge after successful completion of the A.N.S. Course and continue with further training at an appropriate O.C.U. Navigators returning from training in Canada carry out a 9 weeks acclimatisation course at the piston engined A.F.S. (No. 201). National Service navigators receive similar training but undergo basic instruction at civil navigation schools. As with pilots a growing proportion of all navigator training for the Royal Air Force is being undertaken by the Royal Canadian Air Force in Canada.

Both pilots and navigators are confirmed in their commissions as Pilot Officers on an 8 year engagement for "regulars", at the end of F.T.S. and A.N.S. respectively. A small proportion fail to reach the standard required to undertake the duties and responsibilities of officer rank. These are given the option of continuing with flying service as N.C.O.s, or taking a discharge to the Reserve on completion of the normal period of National Service. The length of training before going to an operational squadron for Regular and National Service pilots and navigators (other than Cranwell cadets) is approximately 18 months. For Cranwell cadets, who are all pilots, and currently trained on Chipmunk and Harvard aircraft, the time is three years and two months. Their syllabus of flying is similar in scope and content to that given at the Flying Training Schools but they spend more than two and a half years at Cranwell covering a wide field of general and professional education. At present the ex-Cranwell cadet and the direct entry pilot join paths at the Advanced Flying School to complete their training on jet aircraft.

Signallers undergo initial, basic, and advanced training on a forty-six weeks course at an Air Signallers School. Those destined for Bomber

and Transport Command join with pilots and navigators at the piston engined A.F.S. for further experience in Varsity aircraft. Coastal Command signallers continue at the School of Maritime Reconnaissance after which operational crew training is completed at the O.C.U.s. Engineers and Gunners are given eight weeks initial training at a School of Technical Training. Engineers then receive 12 weeks specialised engineer training at an O.C.U. before crewing up to complete a normal O.C.U. course. Gunners also join a crew for operational training at the O.C.U. after first completing an eight weeks course at the Central Gunnery School. The intake of direct entry engineers and gunners will however be terminated at the end of 1952, and these aircrew categories will be filled by training serving airmen.

To deal with the aircrew training task in 1952 Flying Training Command operated four Groups. No. 54 Group with Headquarters at Benson undertakes all initial training, including military and academic pre-flight training; No. 21 Group carries out the training of navigators and air signallers for which task four A.N.S.s. and two Signallers Schools are now established. No. 23 Group, at Leighton Buzzard, controls all Flying Training Schools, responsible for basic and advanced instruction to "Wings" standard. For this purpose there are Flying Training Schools at Moreton-in-Marsh (Glos), Feltwell (Norfolk), Ternhill (Shropshire), Cottesmore (Rutland), in addition to Heany and Thornhill in Southern Rhodesia. Applied Flying Training Schools for National Service pilots are established at Dalcross (Scotland), Pershore (Worcs), and Wellesbourne. Lastly No. 25 Group, quartered at Manby (Lincs) is charged with the conversion and training of pilots on jet aircraft through the medium of ten Advanced Flying Schools. Of these, Full Sutton (Yorks), Tarrant Rushton (Dorset), Merryfield (Somerset), Western Zoyland (Somerset), Finningley (Yorks), and Worksop (Notts), were all opened during 1952.

The Operational Conversion Units, by types, being operated in the R.A.F. are as follows:

#### Fighter Command

Combined Day Fighter and Fighter Reconnaissance O.C.U.s.

Meteor T7, F.8, FR9, Vampire 5B, Vampire T11

All Weather and Night Fighter O.C.U.s.

Meteor T7, Meteor NF11, and Vampire NF10.

Air Observation Post O.C.U.s.

Auster 5, 6, and 7.

#### Bomber Command

Medium Bomber O.C.U.s.

The medium bomber O.C.U.s. closed down during 1952.

Operational Training on Lincoln and Washington aircraft, is now given at unit level.

Light Bomber and Target Marker O.C.U.s.

Canberra B2 and Mosquito aircraft.

Short and Long Range Photographic Reconnaissance O.C.U.s.

Meteor T7 and PR10, Mosquito PR35 (re-equipping with P.R. Canberra).



Coastal Command

Long-range Maritime Reconnaissance O.C.U.s.  
Sunderland, Shackleton, and Neptune aircraft.

Transport Command

Long-range and Medium-range Transport O.C.U.s.  
Hastings and Valetta aircraft.

The successive stages of aircrew training make steadily increasing demands on the ability, intelligence, and stamina of the pupil as the field of instruction widens and the tempo of flying intensifies. Some pupils, unable to attain the standards required, which have remained high even under the stress of expansion, are suspended at each stage. Those who successfully complete O.C.U. Training are posted to operational squadrons in the role for which they have shown most aptitude during training.

CENTRAL INSTRUCTORS SCHOOL

With an expansion of training it is essential that highly skilled and competent instructors are available in sufficient numbers to provide instruction of the highest order and to ensure high qualitative performance in the trained aircrew. Potential instructors are therefore selected from experienced squadron personnel and taught the art of instruction, at the Central Flying School, Navigation School, or Central Gunnery School. On completing the course they join the various training units to pass on their knowledge and to ensure that high standards of performance are maintained at all stages of training. It has not been easy to provide the large number of instructors required. Faced with the problem of manning an expanded front line the operational commands can ill afford to part with experienced pilots, especially those with a reasonable number of jet flying hours in their log books. Fortunately the flow of potential instructors from squadrons has been reinforced by the re-entry into the R.A.F. of wartime instructors already well versed in training methods. After short refresher courses they have been able to return to instructional duties. Few of the re-entrants however have any jet flying experience.

Exceptional measures have been necessary to supplement the instructional staff at the jet A.F.S.s. Pupils who show the right qualities of flying skill, tact, and temperament needed for instructing are earmarked on passing out from the A.F.S. After a full course at the Central Flying School to develop their instructional technique on jet aircraft they return to the A.F.S., for an 18 months tour as instructors, before joining an operational command. Although only used as a passing expedient these young instructors have proved very successful. Flying skill and good personal qualities have gone far to offset comparative lack of experience and seniority, in commanding the respect of their pupils.

Apart from the production of skilled instructors the central schools are the fountainheads of wisdom on instructional techniques, and the guardians of flying and training standards throughout the R.A.F. The Central Flying School can perhaps claim the proudest history, being first formed shortly before World War I, when Smith-Barry started his famous Gosport system of pilot training. His methods are still fundamental to R.A.F. flying training to-day, which is recognised as the finest in the World. Although individual instructors are encouraged to develop the



presentation of exercises in the manner best suited to their personalities, standardisation of doctrine is essential to training. The Central Examining Wing based at C.F.S. undertakes regular visits to training units and operational squadrons at home and overseas for the purpose of checking training and flying standards; assisting the units with recommendations for improvement in methods and organisation, and spreading the latest ideas and techniques. Members of the Wing are all A category instructors who form a team which combines an extremely wide knowledge of all aircraft types and flying roles.

There is always a danger that training may be looked upon not as the means but as an end in itself. To guard against this possibility regular conferences are held at the Central Flying School at which representatives from the operational commands, units of the training organisation, and Air Ministry, meet together to pool ideas and to ensure that the product from training satisfies the needs of the customer. The staff of C.F.S. also carry out evaluation trials on new training aircraft and advise on the preparation of instructional syllabuses.

#### ROYAL AIR FORCE FLYING COLLEGE

The system of aircrew training described in the foregoing paragraphs is designed to provide the R.A.F. with first class pilots, navigators, and aircrew members. The task of the Flying College is to ensure that air staff officers and potential air commanders thoroughly understand the capabilities and limitations of modern aircraft, weapons, navigational aids, and operational techniques so that the skill of the aircrews can be applied with the most telling effect in air warfare. Officers of the rank of wing commander and group captain are specially selected to attend a year's course at the Flying College. They have the opportunity to fly a wide variety of the latest piston and jet engined aircraft and to gain a comprehensive practical knowledge of the operational problems of all branches of the air force. The aircraft at Manby, where the Flying College is based include Meteors, Canberras, Vampires, Lincolns, Hastings, and Varsities. These are used in all forms of tactical employment, and for long range exercises to British overseas theatres and other countries in the Western alliance.

The College provides a central meeting place for a wealth of ability and experience which is brought to bear on the solution of practical problems in air operations. As such its work is complementary to, but does not replace, that of the R.A.F. Staff College. The latter seeks to train active minds to sift and weigh all the factors in a given situation and to set down their argument and conclusions in concise language. At the Flying College trained staff minds are brought to grips with practical problems in the employment of real aircraft, real weapons, and real aids. It is usual though not mandatory for Flying College students to be graduates of the R.A.F. Staff College.

#### TECHNICAL TRAINING

Air operations cannot be conducted successfully without the support of an efficient technical branch. The New Trade Structure which was introduced in January, 1951, is now getting into its stride after the inevitable difficulties entailed in the realignment of trades and training courses.

Under the new structure every airman can be guaranteed a progressive career throughout his service, depending entirely on his own capacity and skill. At the same time the introduction of advanced training courses and qualifying tests at each stage of promotion ensure that technical skill and knowledge keep step with the growth of practical experience, thereby placing a premium on merit as well as seniority. The outstanding feature of the new scheme is that it provides a Technician Career in parallel with a Command Career. Hitherto promotion to N.C.O. rank was confined to those who had the qualities of command. Even so the vacancies in each rank were limited by the numbers needed for exercising command. The resultant block to promotion was naturally a source of frustration to keen and able airmen. Now promotion in the Technician Career is not restricted by establishment vacancies. It depends solely on passing the appropriate trade tests after completing a qualifying period (usually five years) in the previous rank. The Technician not only gets increased pay with promotion but also increased status. His privileges compare approximately with those of his opposite number on the Command "ladder"; for example a Senior Technician becomes a member of the sergeant's mess. By this means, the man of strong technical bent, largely freed from command responsibilities, can concentrate on development of his technical ability. This cannot fail to raise the standard of aircraft maintenance in the R.A.F. An outline of the career system is shown in the diagram (page 342).

After recruit training airmen whether Regular or National Service receive basic trade training, either at a Technical Training School under the control of Technical Training Command or else on the job in a unit. On completing basic training airmen spend the next four or five years as semi-skilled mechanics in the rank of Aircraftman I, mastering all aspects of their trade, and broadening their education. All units provide facilities for trade training and general education both during and outside working hours. This phase of trade training is spent on productive servicing in the operational commands. At first simple tasks are tackled under supervision; frequently general aircraft handling and daily servicing. As the airmen gain experience and prove capable of doing jobs on their own they are promoted until becoming fully skilled Senior Aircraftman fit for selection to undergo advanced training courses.

The design of advanced training courses for each of the newly defined trade groups has been a major task for Technical Training Command. They are perhaps the most important stepping stone in the airman's career, besides being of great importance to the R.A.F. as the means for the consolidation and guidance of the technical skill and knowledge of direct entry airmen and boy entrants. The airman who passes both parts of the advanced training course has reached the turning point in his career, for he can elect to follow the command or technical path to promotion, and has won the opportunity for advancement to a supervisory grade. Naturally advancement is confined to those who undertake to serve for a total of ten or twelve years or who re-engage with a view to pension.

Boy Entrants, who carry out 18 months at a special training school, and Aircraft Apprentices who undergo a comprehensive three year course at Halton or Cranwell also phase into the New Trade Structure. Boy Entrants pass into the service as leading aircraftmen, and qualify more

rapidly for advanced training, while Apprentices by virtue of their long and intensive training join their first units as Junior Technicians. Aircraft Apprentices are specially selected, by entrance examination from candidates between the ages of 15 and 17. Apprenticeship at Halton (for Fitters) and Cranwell (for Electronic and Electrical Trades) offers not only one of the finest technical courses in the country but also an opportunity to broaden the mind in general education and in the wide range of well organised spare time pursuits. The best apprentices from each entry are considered for selection for cadetships at Cranwell. Ex-apprentices with their excellent educational and technical background also provide a rich field of selection for future commissions in the technical branches.

In recruiting technical manpower the R.A.F. faces powerful competition from the needs and attractions of industry and numbers are still inadequate to meet all establishment vacancies, particularly in the supervisory posts. Entries to the Apprentices and Boy Entrant Schools have greatly improved and renewed efforts are being planned to increase the attractions of these schemes, and to bring their merits to the notice of technically minded youth. But owing to their long basic training it takes time for the benefit of their increasing numbers to be felt in the service. The immediate need is for more serving airmen, whether Regulars or National Service to sign on for long engagements of at least 10 or 12 years. The New Trade Structure offers many inducements. It is now more clearly understood by airmen, and the opportunities which it offers for advancement are readily apparent on units where a steady flow of promotion is replacing the stagnation and frustration of the post war years.

### FUTURE DEVELOPMENTS IN TRAINING

During 1952 aircrew intakes reached a peak and the R.A.F. training organisation surmounted the most critical phase of the expansion. Training times were reduced to a point which though adequate for the maintenance of flying standards was below the optimum for the best and most thorough assimilation of instruction and general service experience. Pilots entering flying training in January, 1953, will receive longer periods of instruction and a larger number of flying hours at the F.T.S. where the course will be extended from 180 hours in 36 weeks to 205 hours in 48 weeks. Flying hours and course lengths will also be extended at the jet A.F.Ss.

In navigation training there will be little change in the basic stage but applied training will become functional to meet the special requirements of particular commands. The Anson, for many years the standard basic navigation trainer, will be replaced by the Marathon towards the end of 1953.

Perhaps the most significant development in training has been the decision to make an earlier start on conversion to jet aircraft. This is a logical step to meet the needs of a service in which piston engined aircraft are rapidly assuming the minority. The aim in planning the new sequence of pilot training has been to reduce the number of separate stages and to ensure that pupils are not called upon to make too great a stride in passing from one stage to another. The stages now employed are too many and are not quite as even as could be wished. Moreover it is undesirable that



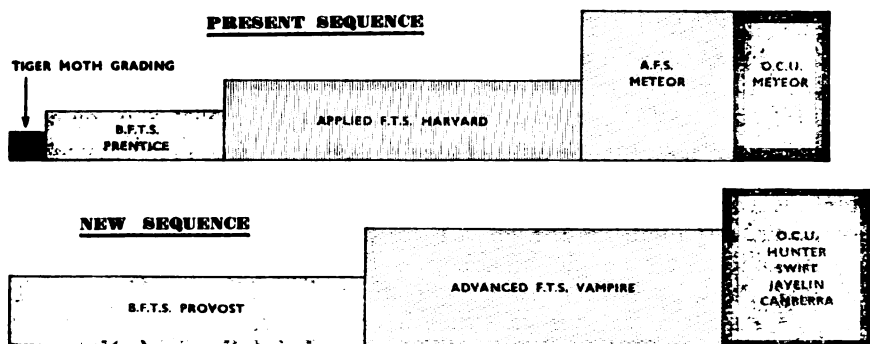


pupils should spend too much time on piston-engined aircraft since they are likely to form "piston" habits to which they may revert in emergency when flying jets.

There will soon be available a family of training aircraft that will provide a very well-graded sequence and will enable a pupil to go smoothly on to jets at an earlier stage of his training. The new members of this family are the Provost, The Vampire T11, and the Canberra, though some other existing types will still be used.

The Provost was built to an Air Ministry specification as a replacement for the Prentice. Powered by a 550 H.P. Alvis Leonides engine the Provost is a side-by-side trainer, with fully duplicated controls and fixed undercarriage. It is fully aerobatic with excellent control response and combined versatility in performance with pleasant and easy handling qualities to inspire confidence in a beginner. The Balliol was formerly intended to replace the Harvard but for various reasons that were no fault of the manufacturer, the production of the Balliol was long delayed. Before its delivery began the dual Vampire was produced and it soon became clear from trials of the Provost and this dual Vampire that between them they shared so many of the advantages of the Balliol that the Balliol would be unnecessary as an intermediate step. Moreover, the elimination of the Balliol would enable a pupil to get on to jet aircraft earlier by closing the gap.

The future F.T.S. stage will therefore consist of Provost and Vampire. Pupils will be taught all that can usefully be learnt on the Provost, which will be quite a lot and will then go on to the Vampire on which they will qualify for "wings". As this sequence is introduced, jet A.F.Ss. will no longer be necessary. The introduction of the new system will begin in the latter part of 1953. The diagram below gives a comparison between the present and the new sequences.



## MAIN OPERATIONAL ROLES OF THE ROYAL AIR FORCE

The real test of the training organisation comes in the operational commands where, in addition to normal flying duties, aircrew and technical services alike are subjected to frequent periods of intensive operations in the course of air exercises. The air exercises of to-day achieve a scale and realism never previously attempted in peacetime. Furthermore the great defensive organisation of the North Atlantic Treaty nations provides

unprecedented scope in geographical area and strength of land, sea and, air forces for extensive combined exercises. These exercises are invaluable for developing the efficiency of the R.A.F. in its main operational roles.

#### HOME DEFENCE

Fighter Command is charged with the defence of the United Kingdom against air attack. Anti-Aircraft Command, which is under the operational control of Fighter Command assists in this task. The detection of enemy approach by the radar screen is supplemented by the visual warning organisation of the Royal Observer Corps also under the control of Fighter Command. An elaborate communication network allows all three organisations to co-ordinate their efforts to the more efficient destruction of attacking forces. Fighter Command also undertakes as a secondary responsibility the training of squadrons in tactical support of the Army and in the protection of coastal shipping. The aircraft employed are the Meteor 8, Vampire 3s. and 5s., Meteor Night Fighter N.F.11, and Vampire N.F.10. Venom night fighters are due to be introduced during 1953. Super priority is rapidly bringing nearer the time when Fighter Command will take delivery of the Supermarine Swift and Hawker Hunter, as replacements for the Meteor and Vampire. An important contribution to the front line strength of Fighter Command is made by squadrons of the Royal Auxiliary Air Force. Manned by fully trained pilots the Auxiliary Squadrons, some 20 in all, keep in fighting trim by regular weekend and spare time flying supplemented by annual armament training periods. The Royal Auxiliary Air Force also contributes to Home Defence with fighter control posts, radar reporting, light anti-aircraft squadrons, and transport aircraft.

#### STRATEGIC BOMBING

The direction and control of strategic bombing operation is vested in Bomber Command. From headquarters located at High Wycombe (Bucks), the Command controls No. 1 Group, Bawtry (Yorks), and No. 3 Group, Mildenhall (Suffolk). In its secondary role Bomber Command provides support for the other services. Perhaps because the medium bomber aircraft with which the Command is currently equipped—namely the Lincoln and Washington (B29)—cannot be regarded as long range bombers meeting modern requirements, there has been a tendency to look upon Bomber Command as a token force which has relinquished the real responsibility for strategic bombing to the United States Air Force. Nothing could be further from the truth and nothing could be more unwise. Any false impressions which have not already been removed by the debut during 1952 of the Avro Vulcan and Handley-Page Victor to supplement the Valiant as replacement aircraft for Bomber Command, will surely not survive a recent declaration on the place of the Bomber in British policy, by Marshal of the Royal Air Force Sir John Slessor, in which he stated:

We have an unparalleled contribution to make in quality, in fighting value, in battle experience, in technique, design, and invention. The British four-jet bombers now flying are the best of their class in the world. Are we to be content to provide as our contribution to the Pax Atlantica the ground-support, and maritime aircraft, and the fighters to defend ourselves. . . . If we did

that, we should sink to the level of a third class Power. We cannot live on our historical tradition or on the credit of our past achievements. In war, we should have little or no influence on the direction of Allied Strategy or on the determination of terms of Peace.

The potentialities of the new four jet Bombers are dealt with in the section on aircraft development. Their supremacy in the military field is likely to be as clear cut as that of the Comet in civil aviation.

In November, 1952, a School of Bombing was opened at Lindholme. The aim of this important new development is to raise the standards of navigational and bombing accuracy by giving all navigators a thorough grounding in radar and visual bombing techniques before they reach the O.C.U.s. An efficient and powerful bombing force ready, not only to strike at the enemy and to throw him on the defensive but also to provide for our own security, is a prime requirement in the Royal Air Force and the aircrews of Bomber Command are being trained to play a vital part in any future strategic offensive. Throughout the year experience has been gained in high altitude jet bomber operations with the Canberra B2 which has now replaced the Mosquito in the light bomber role. The speed and reliability of this remarkable aircraft have been amply demonstrated in a number of notable flights which have acted as a stimulus to all ranks in the Command.

The Canberra has also replaced the Mosquito in the target marking role while the Canberra is scheduled to take over photographic reconnaissance duties from the Mosquito PR34, and with the Meteor P.R.10 will undertake all high altitude reconnaissance.

#### DEFENCE OF SEA COMMUNICATIONS

The role of the maritime air forces is to ensure the safety, in conjunction with the responsible Navies, of sea communications. This task is undertaken by Coastal Command which exercises control over No. 18 Group (Dunfermline), No. 19 Group (Plymouth), and R.A.F. Gibraltar. The A.O.C. in C. of Coastal Command and his Group Commanders hold a dual responsibility for they act respectively as Air Commander in Chief Eastern Atlantic, Air Commander North East Atlantic, and Air Commander North Sea, under Admiral L. D. McCormick, U.S.N., The Supreme Allied Commander for Atlantic defence. Together with their Royal Navy counterparts these officers and the forces under their control form a strong British contribution to Atlantic defence within the North Atlantic Treaty Organisation.

Equipped mainly with long range Shackleton and Neptune aircraft, and Sunderland flying boats, Coastal Command devotes its operational training to anti-submarine search and patrol reconnaissance and shadowing of enemy surface vessels and convoy escort duties. Aircrews must be able to carry out these tasks by day and night, with or without the assistance of surface vessels. Moreover they must be highly skilled in the special techniques developed for detection of submerged submarines and for anti-submarine attack. The Shackleton fitted with four Rolls-Royce Griffon engines, and the latest radio and electronic gear for submarine detection has proved itself as a very reliable and sound aircraft during intensive long range exercises in 1952. It has a large bomb bay which readily accommodates special anti-submarine weapons or an airborne lifeboat. Armament consists of four 20 mm. cannon and the crew of ten



can take comfort from the fact that an excellent performance on partial power will bring the aircraft home from the sea in the event of engine failure. A helicopter flight of Bristol Sycamores which formed last year to study the potentialities of the type for anti-submarine and reconnaissance duties met its first success this year when a Helicopter patrolling the Firth of Forth during a combined exercise located a submerged submarine and guided surface vessels to a successful attack.

Every opportunity is taken to foster the close co-operation between shore-based aircraft and naval forces, which the last war showed to be so essential for success in maritime operations. The Joint Anti-Submarine School where the Navy and Air Force obtain practical experience of teamwork in anti-submarine exercises does much to develop this theme.

#### TRANSPORT ROLE

Transport Command Headquarters is at Upavon (Wilts). The Command is responsible for the carriage of personnel and equipment at home and overseas, and between home and overseas establishments, for the R.A.F. and other services. It is also responsible for providing aircraft for airborne assault and air supply operations. To fulfil these tasks the Command is equipped with the Handley Page Hastings for long range work and the Vickers Valetta for medium range duties.

Apart from transporting men and material the Command undertakes the delivery of aircraft to and from overseas theatres through the medium of the overseas ferry unit. Ferry pilots gain a wide variety of flying experience. The delivery of a Vampire to Hong Kong may be followed up in the following month with the task of collecting an Anson from Rhodesia. An important part of crew training is carried out in conjunction with the Army in the mounting and execution of airborne assault and supply operations. Air evacuation of casualties is another task which calls for regular training to ensure that the ground organisation and aircraft work smoothly together for the rapid removal of wounded to base hospitals. The Commander-in-Chief, as Inspector of Transport Services, is responsible for the inspection of air transport trunk routes and advises the overseas commands on the training and operation of overseas based transport forces.

#### TACTICAL ROLE

Tactical Air Forces are composite formations including light bomber, fighter, fighter ground attack, and reconnaissance squadrons. There are three mainly tactical formations in the Royal Air Force: 2nd Tactical Air Force with headquarters at Bad Eilsen, Germany, Middle East Air Forces, and Far East Air Forces. 2nd T.A.F. is being merged into the 2nd Allied Tactical Air Force which is to guard the Western Europe approaches and to give support to associated land forces. Two Allied Tactical Air Forces have now been established:

Northern Sector—2nd Allied T.A.F. Under the command of C.-in-C., 2nd T.A.F.

This force includes:

- 2nd T.A.F., Royal Air Force
- Netherlands Tactical Air Command
- No. 2 Belgian Wing including Nos. 1, 2, and 3 squadrons

The 2nd Allied T.A.F. is equipped with Meteors, NF11, Vampires 5 and 9, Venoms, Thunderjets, Meteor PR10s, Meteor F.R.Gs. Sabres will be introduced during 1953 to form the interceptor force. Central Sector—4th Allied T.A.F. Under the command of U.S.A.F. air commander.

This force includes:

United States 12th Air Force

French First Air Division, including Nos. 1, 2, and 3 squadrons

An Air Division of the Royal Canadian Air Force

The 4th Allied T.A.F. is equipped with Thunderjets, Vampire 5s, B26 Invaders, C.119 Packets, and F.86E Sabres of the R.C.A.F. French Ouragan jet fighters will be introduced during 1953.

The Headquarters of the Middle East Air Forces is at Ismailia, Egypt. The Command covers a large geographical area which it controls with the assistance of the following subordinate formations—No. 205 Group, Fayid; No. 206 Group, Abyad; Air Headquarters Malta; Headquarters British Forces, Aden; Air Headquarters, Iraq, and A.H.Q. Cyprus. The aircraft of the Command, which include Vampire 9, Meteor PR10, FR9, N.F.11, Brigand B1, Mosquito N.F.36, Lancaster G.R.3, Valetta C.1, and Auster 6 were fully extended during a large scale air defence exercise over the Canal Zone in February, 1952.

Headquarters Far East Air Forces is at Changi (Singapore) and its subordinate formations comprise Air Headquarters, Ceylon, Air Headquarters, Malaya, and Air Headquarters, Hong Kong. The aircraft deployed are Vampire 9, Brigand, Mosquito P.R.34, Spitfire P.R.19, Valetta, Sunderland, Hornet 3/4, and Auster. For casualty evacuation from jungle clearings various types of helicopter, principally the Sikorsky are being employed with excellent results. In conjunction with Lincolns and Dakotas of the Australian and New Zealand air forces aircraft have continued to carry out air strikes against bandit concentrations, and air drops for supplying our ground forces. Sunderlands have also continued with reconnaissance duties in Korean waters throughout 1952.

### GENERAL TRAINING

Throughout 1952 all units were exercised in their primary roles and in support of the other services. A summary of the major exercises of the year is given at the end of this section. The operational squadrons have been busily engaged in raising large numbers of fully trained but young and inexperienced aircrew to battle worthiness, at the same time exploiting the new aircraft with which many units have been re-equipped. In addition to simulated operations Royal Air Force squadrons and aircrew have been actively engaged in overseas areas where friction on the borders of the cold front has generated undue warmth, notably in Malaya and Korea.

In Fighter Command all the night fighter squadrons have received two-seat radar-equipped Jets, the Meteor N.F.11 and Vampire N.F.10, while the Gloster Javelin delta fighter is being groomed with the aid of super priority as an even more powerful replacement for the future. More squadrons of Canberra jet bombers have been formed in Bomber

Command to provide experience in high altitude jet bomber operations prior to the introduction of the Valiant and other aircraft. The 2nd Tactical Air Force has started to receive Venom fighter bombers which with a performance greatly superior to the Vampire particularly in climb and high level performance will increase the striking power of our air forces on the continent. The first swept wing F86E Sabres destined for this Command arrived in England during December. The wartime Lancasters of Coastal Command have been replaced by Shackletons and Neptunes whilst Flying Training Command has introduced the Vampire T11 jet trainer, and on a limited scale the Balliol, into the flying training role.

The introduction of the Canberra into squadron service has virtually doubled the speed and height of bomber squadrons. This had an immediate effect on the realism of air exercises which in previous years had been dependent on Vampire fighters to play the part of high-flying jet bombers. The Canberras, despite stiff opposition from Venoms and Sabres gave a particularly good account of themselves in "Ardent", the major exercise of the year. Bomber Command also stepped into the limelight with a series of notable flights in Canberras which not only contained great intrinsic training value for pilots, navigators, and technical services alike, but also produced record breaking results and established a "new look" for senior air commanders. On September 28, Wing Commander H. P. Connolly, with the Commander-in-Chief, Air Chief Marshal Sir Hugh P. Lloyd as second navigator flew a standard Canberra to Nairobi in the record time of 9 hours 55 minutes, at an average speed of 427 m.p.h. The mobility of Commanders-in-Chief can be judged from the fact that on this occasion his second in command was able to inform a "pre-Ardent" press conference that unfortunately the C-in-C was away at Nairobi to-day but would be back tomorrow to answer any further questions. In Nairobi the C-in-C attended farewell ceremonies to No. 82 squadron which returned to England in October having spent six years in Africa, photographing 1,216,000 square miles of territory for the Directorate of Colonial Survey.

Bomber Command also made the major overseas goodwill and training tour of the year; the visit by four Canberras of No. 12 Squadron to Chile for the Presidential Inauguration on November 5. Led by Air Vice-Marshal D. A. Boyle, Air Officer Commanding No. 1 Group the Canberras left Binbrook on October 20 and returned to England on December 5, having flown 24,000 miles, visiting eleven foreign countries and four Colonial territories, without any major defect, if one excepts an unfortunate contretemps with a high flying eagle. This achievement thus baldly stated covers a wealth of careful planning and pre-flight organisation. Air support for the flight was provided by three Hastings of Transport Command.

In the Arctic Coastal and Transport Commands provided support for the British North Greenland expedition over an extended period between August and October. Five Sunderland flying boats and two Hastings, with a total crew complement of 87 officers and airmen, carried 250 tons of equipment to assist the Expedition in establishing its ice cap bases. With the aid of a depot ship the Sunderlands operated successfully from unprepared alighting areas in Young Sound on the north-east coast of Greenland, and Britannia Lake which was the main base for the expedition.

Despite the severity of weather and difficulties of loading the Sunderlands kept the airlift going at the rate of 4 and sometimes 5 sorties per day, besides gaining much information on the feasibility of regular air operations from Greenland bases.

Other overseas flights were completed as routine training. In January aircraft of the R.A.F. Flying College left Manby (Lincs) on flights covering 115,000 miles, visiting Australia, New Zealand, Canada, U.S.A., and Japan. In September, five aircraft from the same unit made a series of arctic training flights including one over the North Pole. Other Manby aircraft visited Ascension Island, Shackletons of Coastal Command visited Ceylon, and routine training flights by aircraft of Flying Training Command went to Canada, the Middle East, Gibraltar, Malta, and the Continent. A notable ferrying operation by Transport Command, completed in May was the delivery of Vampire 9 fighters to Singapore and the return to England of Mark 5 aircraft. Some pilots made the 17,360 mile return journey three times, an achievement which is no less remarkable for remaining unsung and is a tribute to the skill and stamina of "average" R.A.F. pilots. During December pilots of the same ferry unit delivered Sabre fighters from Canada to Abingdon, flying via Greenland and Iceland. Here again, when the range of the single seat Sabre is related to the long sea crossings between Goose Bay (Labrador) Bluie West (Greenland), Keflavik (Iceland), and Prestwick it will be seen that another remarkable flying feat has been achieved under the modest guise of routine delivery. As safety precautions weather ships are stationed midway between shore bases on the sea crossings, while search and rescue aircraft orbit midway between the weather ship and either shore. Both provide beacon homing and VHF R/T for the ferry aircraft which usually fly above the overcast in sections of four.

R.A.F. operations in Malaya have continued throughout the year and regular attacks were made against terrorist targets by Vampires, Hornets, and Brigands. Helicopters on casualty evacuation sorties have now lifted more than 200 wounded men from jungle clearings, whilst transport aircraft have continued with supply drops to the ground security forces.

In Korea more R.A.F. pilots have been attached to Dominion and American fighter and ground attack squadrons engaged in the campaign, and are gaining "live" experience against the high performance Russian MiG 15, several of which stand to their credit as destroyed or damaged. Austers of the Air Observation Post and Light Liaison Flights have worked with the Dominion ground forces.

## AIR EXERCISES—1952

### EXERCISE—"HIGH TIME"

February 26-28

During February exercise High Time was held in the Canal Zone to exercise bomber and fighter formations and to give pilots, aircrew, and radar control and reporting staffs combat experience. Throughout a three day mock air battle widespread raids were made by heavy bomber forces of Lincolns, while Meteors simulating high speed jet bombers attacked all 205 Group airfields in the Canal Zone. Other types of jet aircraft made dusk "sneak" raids.

The bomber forces engaged in the exercise flew almost five thousand hours and were intercepted and engaged during their approach to the objectives by a full Vampire Wing from the zone. Other Vampires carried out high altitude attacks from an advanced airfield.

The scale of the exercise brought into play the whole defence mechanism of the R.A.F. defence organisation in the Canal Zone. Valuable training was gained in the concentration of bomber forces over target areas, and the provision of fighter escort, while ground crews were thoroughly exercised in the rapid refuelling, rearming, and servicing of aircraft taking part.

#### EXERCISE—"CASTANETS"

June 18-25

Castanets was the largest international maritime air exercise since World War II. The purpose of the exercise was to test the wartime command organisation of the N.A.T.O. Channel Command, the British Home Command, and the N.A.T.O. Eastern Atlantic Command. It was designed to exercise ships and aircraft in war time roles, particularly that of trade protection and to try out new operational techniques and administrative systems. The naval and air forces of Canada, France, the Netherlands, and the United Kingdom; naval forces of Belgium, Denmark, Norway, and Portugal, and air forces of the United States based in the United Kingdom and on the continent took part in the operations. The area of the exercise extended from a position about 300 miles west of Ireland, to the Atlantic seaboard of Southern Norway, Denmark, the Netherlands, Belgium, and France as far south as Brest. More than 250 ships, including a battleship and five aircraft carriers were engaged together with 400 jet and piston engined aircraft. Air operations were under the general control of Air Marshal Sir Alick Stevens who for the first time exercised his responsibility over three commands—as A.O.C. in C. Coastal Command, as Maritime Air C. in C. Channel and North Sea, and as Maritime Air C. in C. Eastern Atlantic.

Spread over eight days the exercise provided admirable opportunities for the naval air forces of the N.A.T.O. countries to work together as a team and for aircraft and ships to exploit the latest weapons and devices in both attack and defence. Shackletons of Coastal Command stood up well to their first major spell of intensive flying and flew 1,575 hours on anti-submarine patrols, convoy escort, and shipping reconnaissance. Fifty-one submarines were sighted by Coastal Command aircraft of which 34 were attacked. Sightings of enemy surface vessels totalled 91. For the first time helicopters were used for inshore patrols. One of these aircraft flying over the Firth of Forth, sighted a submarine at periscope depth which was subsequently sunk by surface forces called to the scene.

#### EXERCISE—"BEEHIVE"

June 19-21

Exercise "Beehive" produced the most intensive operations seen over Malta since the war. Warships and aircraft of five N.A.T.O. nations—Britain, America, France, Italy, and Greece—were engaged. For three days naval, military, and air force installations on the island were the

object of frequent air attack by American Banshees, Corsairs, and Sky-raidern. R.A.F. Vampires and Royal Navy land-based Sea Furies defending the island were called upon for maximum effort to repel the attacks. Fighters made as many as five and six sorties daily, between dawn and dusk, most of which resulted in aerial combats at altitudes up to 32,000 feet where the Banshees were operating. No. 604 R.Aux.A.F. Squadron, in Malta for summer camp, also took part in the air defence. The fighter control staff were kept fully occupied throughout the exercises which also provided the first opportunity for women of the newly formed R.A.F.V.R. Malta to take their places at the plotting table beside R.A.F. airmen.

R.A.F. maritime reconnaissance Lancasters located the American naval forces converging on the island and did valuable work in shadowing and reporting positions of the ships engaged in the attack. They also provided anti-submarine escort for two defending forces securing several sightings and two kills.

#### EXERCISE—"JUNE PRIMER"

June 23-29

June Primer, which started on June 23 and ran for four days, was a limbering up exercise for Allied Air Forces Central Europe in preparation for the large scale combined exercises held later in the year. In order to make best use of the available forces June Primer was timed to coincide with Barrage, a regular fortnightly defence test; Bullseye, a periodic night raid by Bomber Command aircraft from U.K., and Skyscraper, the trial daylight bombing runs of the U.S. 7th Air Division from Great Britain. R.A.F. Fighter Command provided the strong jet raider forces necessary to give June Primer realism.

#### EXERCISE—"CAST ANCHOR"

August 27-September 6

Four Royal Air Force Commands co-operated in the biggest casualty air evacuation exercise ever to be held in the United Kingdom. Designed to test plans for the rapid air transport of wounded and sick so that they may have the best chance of quick recovery, operational and medical control of the exercise was vested in Transport Command. A self supporting casualty air evacuation formation, able to despatch several hundred cases a day by air dealt with the reception and clearance by air of nearly 200 simulated casualties. During the latter part of the exercise the whole unit moved to R.A.F. Kirby for a practice deployment with emphasis on night movement and handling of casualties. Valetta, Anson, D.H. Beaver, and Proctor aircraft took part in the exercise.

#### EXERCISE—"RUNAGROUND"

May 8

This combined exercise, the biggest since the war, featured an amphibious assault over the Eastney Beaches in Hampshire. The main assault forces of tanks and infantry were preceded by reconnaissance parties of Royal Marine Commandos and frogmen. The latter swam ashore after parachuting into the sea from R.A.F. transport aircraft. Close air support was provided by jet ground attack aircraft, while special signals units were lowered on to the beaches from Helicopters.

## EXERCISE—"MAINBRACE"

September 13-23

Three Royal Air Force Commands were actively engaged in "Mainbrace"—Coastal, Bomber, and Flying Training. The object of this major maritime exercise was to test the forces of the Supreme Allied Commander-in-Chief, Atlantic, in co-operation with the forces of the Supreme Allied Commander-in-Chief, Europe, in defence of the northern flank of the North Atlantic Treaty Organisation area, and particularly to exercise the ships and aircraft of the N.A.T.O. countries taking part in tactical co-ordination over an extended period. It was predominantly an exercise for Maritime Forces, both sea and air, in support of land and air forces in Northern Europe.

Aircraft from the United States, France, and Holland operated alongside those of R.A.F. Coastal Command from bases in England, Ireland, Scotland, the Shetland Islands, and Norway. Shackletons, Sunderlands, and Mariners of the U.S. Navy co-operated with large carrier borne air forces in support of land forces operating in Norway and Jutland. Working for the "opposition" Lincolns and Washingtons of Bomber Command simulated high level night attacks against shipping and carried out mining sorties in Scottish waters, while Lincolns, Varsities, and Wellingtons of Flying Training Command carried out medium level attacks on shipping.

The carrier forces and convoys operating along the Scandinavian coast and Skaggerak were intercepted and attacked by jet fighter squadrons of Norway and Denmark, flying Vampires, Thunderjets, and Meteors. Making their first major participation in an Allied Exercise in their own country the squadrons were able to gain experience of their capabilities in defensive air manoeuvres against actual opposition. Although bad weather affected certain phases of the exercise it was nevertheless most successful in thoroughly testing the tactical efficiency of N.A.T.O. forces and the Combined Command organisation and communications.

## EXERCISE—"ARDENT"

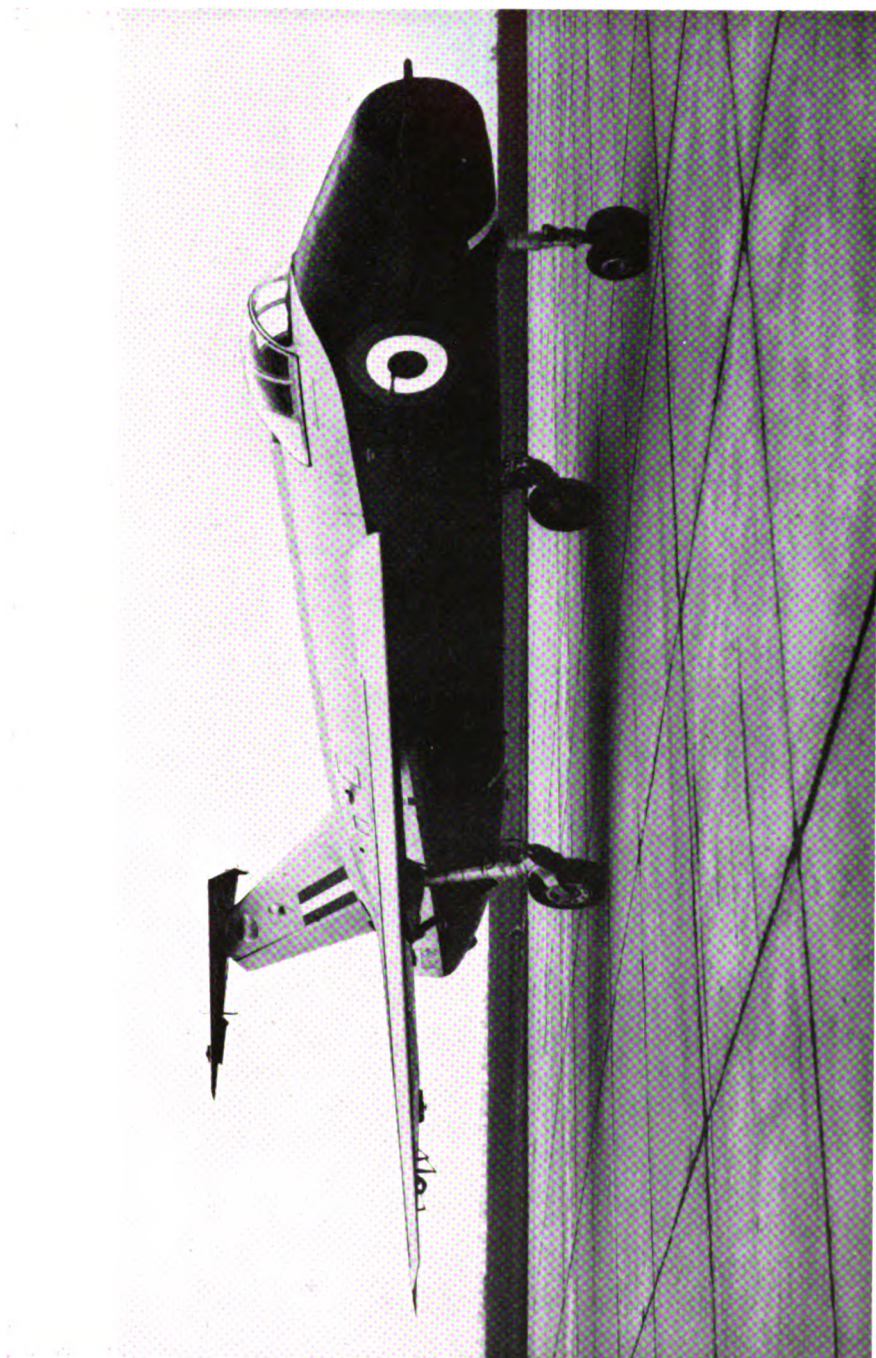
October 3-12

Exercise "Ardent", the largest air exercise ever held was designed to give the air defence system of the United Kingdom an intensive and realistic test against an exceptionally strong offensive force. All Commands of the Royal Air Force in this Country and on the Continent took part and were assisted by aircraft of the Royal Navy, the Royal Canadian Air Force, the United States Air Force, and the Air Forces of the N.A.T.O. continental countries. In addition the exercise provided valuable training for jet fighter squadrons of the Royal Auxiliary Air Force, members of the Reserves, the Royal Observer Corps, and Anti-Aircraft Command.

Altogether some 7,500 sorties were flown and some 200,000 men and women were engaged.

To ensure realism the Air Defence Commander was kept in ignorance of the programme of attacks which developed both by day and night at high and low level against a wide variety and spread of targets. For the first time Canberras operating by day and night were tested against the high performance Venom fighters. It is interesting to note that despite the height and speed of its approach one of the main Canberra raids,





Short Brothers and Harland S.B.3 experimental jet-fighter, with wings of variable sweep





aimed at Birmingham, was successfully intercepted by Venoms before reaching the coast.

Attacking forces included Lincolns, Washingtons, and Canberras of Bomber Command, F84 Thunderjets of the U.S.A.F., Belgian, and Netherlands Air Forces.

#### EXERCISES PLANNED FOR 1953

The principal exercises planned for 1953 in which aircraft will take part are as follows:

- (i) Air defence exercise for Allied Air Forces Central Europe. Participation by Bomber Command, Flying Training Command.
- (ii) Bomber Attacks on Continental targets against A.A.F.C.E. opposition.
- (iii) Air defence exercise in Middle East area, conducted by C-in-C M.E.A.F. with Fighter and Flying Training Command aircraft taking part.
- (iv) Annual Airborne Exercise in Middle East.
- (v) Amphibious Assault Demonstration, U.K. participation by Transport and Fighter Commands.
- (vi) Convoy air defence exercise conducted by C-in-C Channel with aircraft of Coastal and Fighter Commands and 2nd A.T.A.F.
- (vii) French Air defence exercise conducted by French D.A.T. with participation by Fighter, Bomber, and Flying Training Commands.
- (viii) Annual air defence exercise, similar to "June Primer", on the Continent.
- (ix) Annual air defence exercise U.K., similar to "Ardent" 1952.
- (x) Major N.A.T.O. maritime/air exercise.

J. A. HOLMES

## CHAPTER XXIX

### LIGHTNING VICTORY

By J. M. SPAIGHT

#### NEW SUPER-WEAPONS

We have heard much of late of the coming eclipse of the air power which we know and of the approach of an age of push-button warfare. Piloted aircraft, we are told, will have disappeared in another few years. They will be replaced by guided weapons, rockets or ram-jets, fitted with war-heads and controlled by radar from the ground or equipped with electronic devices enabling them to home on their targets without outside control. Manned interceptors will be discarded. The bombers of today will be only a memory. Instead, a strange neo-artillery will take care of all the work of long-range destruction that is needed. Science will evolve methods and instruments of offence and defence which will consign those with which we are familiar to the scrap-heap of history. It may be so; but if it is, why are we in this country, hard up as we are, building great numbers of Canberra, Valiant, Vulcan, and Victor bombers, and Swift, Hunter, and Javelin fighters? It looks as if the revolutionary change is not thought to be just around the next corner. For the time, it seems, we have to reckon with a transitional stage in the evolution of armaments and during it we cannot afford to scrap the old weapons. That was, in fact, the substance of a warning which General Hoyt Vandenburg, Chief of Staff of the Air Force, gave in New York on January 27, 1953. He deprecated "sensational predictions about atomic aircraft, intercontinental weapons, and electronic robots". He urged restraint in the acceptance of "visions of weird mechanical monsters swarming across land, sea, and sky at some unknown date". He added that the development of missiles and that of conventional aircraft were being given equal attention.

#### THE SHORT, SHARP WAR

From the earliest days of aviation there have been suggestions that its effect would be to shorten the traditional processes of war, to cut out the stage of encounters of armed forces, and, by striking directly at the enemy's heart, to bring about the change of mind in the enemy's government to which the defeat of the forces in the field has hitherto been a prerequisite. Long before instruments of mass destruction such as are now available were developed people thought that war could be speeded in such a way. In a debate in the House of Lords on November 29, 1933, one speaker suggested that one or two great air attacks on London and our other big cities "might absolutely cripple us in forty-eight hours."\* Mr. Churchill himself speaking in the House of Commons on November 16, 1937, referred to forecasts (which he evidently considered exaggerated) of a "nine-days' war" which would be decided by "an act of mass terror" against the civil population.† Air enthusiasts were, naturally, quick to

\* Parliamentary Debates, House of Lords, Vol. 90, col. 188.

† Parliamentary Debates, House of Commons, Vol. 329, col. 246.

encourage a view which placed their own arm so prominently and masterfully in the picture. In 1920 General Douhet, in his *War of 19—* described a Franco-German war that would be all over in a week. The German Air Force smashed a number of French cities, and France called it a day.

### A MIGHT-HAVE-BEEN

She called it a day in 1940 in little more than a month when the real fighting began, but that was not because the Germans launched an attack of the Douhet type. They did mount a *Blitzkrieg*, but it was one of tanks and dive-bombers and its aim, which it achieved, was to break the French line of defence. It might well have been the kind of strategic air assault which the Italian general had foretold; it possibly would have been if a certain man who died in 1936 had survived. He was General Wever, the first Chief of Staff of the *Luftwaffe*. He was a fervent advocate of the strategic air offensive and he had begun to create a long-range bomber force for this purpose. In his time the Dornier firm built a four-engined bomber which survived in a modified form. So did the Focke-Wulff FW 200, the Condor, which was used by the Lufthansa as an air liner and was later to be adopted as a commerce raider. But Wever's general plan perished with him; he was killed in an air crash—in the year, by a coincidence, in which Bomber Command was formed in Great Britain. His successor, Generaloberst Hans Jeschonnek, had a different conception of air policy. He favoured a force of light and medium bombers which could co-operate more effectively with the army, and Goering and Udet agreed with him.\* The result was that in 1939 Germany was without the means of launching a strategic offensive, and when she did attempt one against some French centres at the beginning of June, 1940, the results were disappointing. "It was only natural that the destruction should be of small importance; it is not with 300 bombers each carrying a ton of bombs at most and acting against a great number of dispersed objectives that massive results can be expected."† Better results were achieved by the raids which started in the following September against British objectives, but even then the effect was, on the whole, not very impressive. The strategic offensive was a kind of makeshift affair. "The Germans," says Professor Postan, "did not seriously tackle the development of heavy bombers for strategic bombing."‡

Even without heavy bombers they could have mounted a very damaging *Blitzkrieg* against us after the fall of France if they had really had anything like the air strength with which they were sometimes credited in 1940. General Eisenhower has put it on record that Colonel John P. Ratay, who had been military attaché in Bucharest until Rumania joined the Axis, when he returned to the United States, reported that Germany had 40,000 combat aircraft in reserve ready with trained crews to operate at any moment; he believed that they were being held back to support an invasion of the United Kingdom. "In the Operations Division", says General Eisenhower, "we refused to give credence to Ratay's information

\* Werner Baumbach, *Zu Spät?*, Buenos Aires, 1949, p. 23.

† Lieut.-Col. de Saint Pereuse, *Le Bombardement de la Région Parisienne*, in *Forces Armées Françaises*, September, 1952, p. 760.

‡ N. M. Postan, *British War Production*, 1952, p. 326.

concerning the 40,000 operational airplanes. The German Army had just been halted in front of Moscow and we were convinced that no army possessing a margin of this overwhelming strength would have withheld it merely because of a future plan for its use, particularly when its employment would have ensured the destruction and capture of such an important objective as Moscow."\* If Colonel Ratay had been right, we should have had to face an ordeal far worse than that which we experienced in the autumn and winter of 1940-41. Whether, even then, the result would have been our coming to terms with Germany is very doubtful.

### THE KNOCK-OUT BLOW

In the Seven Weeks War of 1866 Prussia defeated Austria quickly because she had superiority of armaments and, in particular, a monopoly of the needle-gun with which her infantry was armed. In 1940 Germany's armour and Stukas enabled her to force France to submit as speedily. It may be that a tactical weapon of the like marginal superiority will give its possessor a similar advantage in future encounters of armed forces. If, however, the lightning victory that is the strategists' dream is to be achieved, it seems more likely to be the result of direct action which by-passes the battle and strikes at the heart of the enemy nation. Support for this expectation is to be found, the advocates of such a policy contend, in the swift collapse of Japan in August, 1945, when a super-weapon was used against two of her centres of population. The fact that she was already a beaten nation and could not have continued the war much longer in any event is not accepted as disposing of the argument. Weapons of much greater destructive power than those of 1945 are now at the disposal of belligerents. "From now on", said President Truman in his Message on the State of the Union on January 7, 1953, "man moves into a new era of destructive power, capable of creating explosions of a new order of magnitude, dwarfing the mushroom clouds of Hiroshima and Nagasaki." The use of the latest thermo-nuclear weapons, the argument runs, will shock an enemy Government into surrender without any need for the preliminary military operations which took place in the Japanese theatre of war. The military decision will, in fact, be side-tracked, with the result of the saving of the hundreds of thousands of lives which might be lost in the recurrent battles of a major war.

That saving would have to be paid for by a different section of one, at any rate, of the nations at war, and the price would be a grievous one. The achieving of the swift political decision would hardly be possible unless the belligerent seeking it were ruthless enough to use instruments of destruction which would stun the nation attacked, leave it bewildered, horrified, reeling from the blow, and to face the inevitable reaction of the outraged moral sense of the world to an act which would have no precedent in the history of war. The belligerent responsible for so acting might have to vaporise the whole of a great city, to wipe it off the face of the earth, to leave a desolation where it had stood. It was something of that order of devastation which Mr. Churchill had in mind when he spoke at the Pilgrims' dinner in London on October 14, 1952, of "indescribable torments" and "horror of a kind and on a scale never dreamed of before

\* D. D. Eisenhower, *Crusade in Europe*, London, 1948, p. 38.

by human beings." The decision in such a war, he suggested, would be reached in the first month—or even in the first week. That would, indeed, be the lightning victory at last. It would be a terrible, an unprecedented episode in the history of war, but at least the agony would be short.

### THE CRESCENTS AND THE HEARTLAND

Is there any likelihood that this foreboding will come to pass? Not very much, the writer suggests, in our time. If a new world war does come in the foreseeable future, it will be one, in all probability, in which the Inner and Outer Crescents are on one side and the Heartland on the other. The terms are those employed by Sir Halford Mackinder when, fifty years or so ago, he formulated his theory of the politico-geographical factors of the problem of power in the international community.\* The Heartland was, roughly, the Soviet empire of today. The Inner Crescent was composed of its immediate neighbours and included, so far as western Europe was part of it, four of the five States which became the parties to the Brussels Treaty of March 17, 1948. Britain, a Brussels signatory, was in the Outer Crescent, which could roughly be regarded as being represented today by ten of the fourteen States (i.e. excluding the Brussels Treaty States with the exception of Britain) which were or later became parties to the North Atlantic Treaty of April 4, 1949. The composition of Mackinder's Crescents is thus not identical with that of the associations created by the two Treaties, but there is sufficient similarity to mark his exposition of the geographical basis of power politics as a remarkable forecast of the international situation as it exists today. There is, in fact, a great crescent of States around Russia's western and southern borders. Western Europe, it has been suggested, has become as a result of the Atlantic Pact a peninsula of the European-Asian land-mass, with two outcrops on the flank, one being Denmark and Norway and the other Italy.† To the east of Italy Greece and Turkey complete the ring around Russia's southern frontier. The Heartland remains substantially as Mackinder conceived it, but it has moved its western border outward, and it is today a more powerful, and menacing, State than it was then. However much the tension between East and West may be eased, and even if some measure of disarmament follows as a result of the relaxation, the fact will remain that Russia is the strongest Power in Europe, and that she has secured for herself in that continent the position of unbalanced and dangerous predominance which it has been Britain's policy for some centuries to prevent any one State from attaining.

Mackinder did not go as far as did, subsequently, Professor Karl Haushofer, who held that the era in which the Powers dominating the sea dominated the world was ended and that the great land mass was the rising sun in world politics. Russia's strength lies in her inexhaustible man-power. She suffered grievous losses in the second world war, but her population was still 200,000,000 in 1949. It continues to increase

\* See Sir H. J. Mackinder's two papers, *The Scope and Methods of Geography* (1887) and *The Geographical Pivot of History* (1904), reprinted with an introduction by E. W. Gilbert, 1951. Mackinder's "Pivot Area" of 1904 became the "Heartland" in his book, *Democratic Ideals and Reality*, 1919.

† *Atlantic Alliance: N.A.T.O.'s Role in the Free World*, Chatham House, 1952, p. 55.

and the danger of a Russian aggression will grow as it moves towards the peak figure. That figure will be reached a year or two before or after 1960, when 19,000,000 Russian youths will be of prime military age. After that the number will decline as those born during the war, when there was a birth deficiency of 6,000,000, will be coming to maturity. "It is wise to remember that the latter part of the 1950's may offer a great danger of Russian aggression—possibly the time of greatest danger."\* If war does come then, it is a safe assumption that Russia will strike by land; otherwise she would not be utilising her greatest advantage, her superabundant man power. It is *not* a safe assumption that she will *never* strike, notwithstanding the apparently fairer prospect of peace afforded by Mr. Malenkov's succession to Mr. Stalin's throne.

### THE DEFENCE OF WESTERN EUROPE

If she does strike in the west, she will be met there, on the Elbe or the Rhine. That is clearly the intention of the authorities responsible for the defence of the western world, and no other course is, in fact, politically practicable. The States of the Inner Crescent will insist upon such a line of defence. They will not be content with being overrun again and again "liberated." In France especially the demand that the frontier shall be defended is unequivocal. "Anyone who wants to throw France into the arms of Communism has only to spread the idea that in the event of war the United States will be content with a peripheral strategy, letting the Russians invade continental Europe to the Atlantic and the Pyrenees and merely expecting to reconquer this territory some years later."† The demand is not unnatural. Think what it would mean if it were not heeded. Western Europe, so far as any effective ground defence is concerned, left to its fate, left to be a no-man's land, abandoned and written-off; the Red hordes sweeping across it to the Atlantic tidewater; Britain battered with V-weapons from beyond the Channel; the big American bombers coming in relays to blast the invaders out again; the destruction, the slaughter, the maiming of thousands of our good friends on the continent in the air attacks on the occupying forces of the Soviet Union; the confusion, disillusion and despair of the free peoples on whom the locust-plague of the men with the slanting eyes has descended: that is what the "defence" of western Europe would mean if it took the form of bombing alone after an invasion. It is a grim outlook for western Europe. It condemns itself. There is neither logic nor expediency in it. It is bad strategy and bad politics.

### WESTERN AIR ACTION

It would indeed be a gamble against Russia. A mighty blow at her heart might possibly bring the war to an end, but there could be no certainty of that. The Red armies might continue to advance of their inherent momentum even if Moscow lay in ruins. New centres of direction might be improvised. The war of the limbs might go on although the main nerve centre was destroyed. The west might be submerged. So, by all the signs and tokens, the western Allies have decided to stand

\* Eugene M. Kulischer, *Russian Manpower*, in *Foreign Affairs*, October, 1952, p. 72.

† Jacques Soustelle in *Foreign Affairs*, July, 1952, p. 545.

and fight if the Russians march. The issue of that encounter will be vitally important. The Allies will have to throw into it every ounce of the strength which they possess. It will be a question of team work, and their air arms will be members of the team. That does not mean that there will be no strategical bombing, though tactical will be more prominently in the picture. There will be plenty of work for the long-range bombers, but it will be directed against objectives the elimination or immobilisation of which will be of assistance to the ground defence. There will be no bombs to spare for air missions which serve another purpose and in particular for those which would be necessary if a political rather than a military result were being sought. It is only by raids of the latter kind, in all probability, that a lightning victory could be achieved—if it could be achieved at all. In the circumstances of an east-west conflict the ground and the air operations will be interlocked. They play up, as it were, to each other. The ground fighting causes the enemy to use up the material which the air operations cause to be in short supply. Neither kind of operation can be fully effective in the absence of the other. The most profitable targets for air attack are those which fit best into the operational pattern thus traced. There are many such targets.

The vast extent of the Soviet empire is at once its strength and its weakness. The dispersal of its industrial centres is an advantage in so far as it affords protection from concentrated air attack. The huge size of the country is a disadvantage in so far as it necessitates very lengthy lines of communication and transportation. Russia's railways are entirely inadequate for her traffic requirements. Her railway network has about one-quarter of the mileage of the railroads in the United States, although the Soviet is three times as large a country.\* There are only seven miles of line to every one thousand miles of surface, or one-eleventh of the corresponding ratio in the United States.† The effect of the inadequacy of Russia's railways, together with the fact that her waterways are frozen for five or six months of the year, is that she is unable to exploit her coal and oil resources fully.‡ The Russian roads, too, are insufficient, as well as being of poor quality. "Except on a very few trunk roads, highways play only the modest part of feeders to the railway, and the 700,000 cars and lorries which pass over them have not been able to carry more than 2 per cent. of the goods to be transported."§ The consequence is that Russia is dependent on her railways to an unusually great extent, yet the route mileage which they cover is smaller in proportion to population than that of any other European country. The interruption of the connecting railway system would consequently have a far graver effect on her economy, in peace and war alike, then it would have in the normal country, and would make it very difficult for her to maintain her war effort. It is for that reason that an air offensive which was directed against transportation would be calculated to give results of military importance, whereas one aiming at a political decision might not. Russia is, in fact, about the worst

\* A. J. Steiger in *U.S.S.R.*, edited by E. J. Simmons, 1947, p. 273.

† Georges Jorré, *The Soviet Union: The Land and the People*, English translation, 1950, p. 183.

‡ Jean Chardonnet, in *Revue de Défense Nationale*, January, 1952, p. 33.

§ Georges Jorré, *op. cit.*, p. 174. In 1938 89 per cent. of the Soviet Union's inland goods traffic was carried by rail, 8 per cent. by waterways, and 3 per cent. by road (P. E. Garbutt, *The Russian Railways*, 1949, p. 67).



country that could be chosen for the application of a strategical experiment of the latter kind. She is too big, sprawling, spread out, and for that reason she is particularly vulnerable logistically but politically not very much so. Her logistics are, in fact, her solar plexus. A blow there would hurt her more than would one at her head. It will not knock her out at once but then nothing would do that, in all probability. A French military writer has said that the swift victory which some Americans expect to follow on "la Blitzkrieg facile même de deux ou trois mois" is nothing but a "dangerous illusion".\*

### RUSSIA INURED TO DEVASTATION

In a free, democratic country a speedy decision might be brought about by the force of public opinion. The people might revolt against a prolongation of the calamities of which they were the victims, or, alternatively, the rulers of the country might of their own accord decide to end the war to save the population from further sufferings. Realisation of the former of these possible results was hoped for by Hitler when he invaded Russia in 1941. "Hopes of victory were largely built," said Field Marshal von Kleist after the war, "on the prospect that the invasion would produce a political upheaval in Russia . . . and that Stalin would be overthrown by his own people if he suffered heavy defeats."† These hopes, we know, were disappointed. As to the other possibility referred to, can anyone imagine the gang which is in power in Russia caring anything for the sufferings of the people? And would those sufferings be so very much worse than those which they endured in 1941-44? The devastation of western Russia then was terrible in its thoroughness and extent. "The destruction wreaked by the German armies on the Soviet Union when they retreated was on a scale greater than anything done by bombs or shells in the west."‡ "When we flew into Russia in 1945," General Eisenhower has stated, "I did not see a house standing between the Western borders of the country and the area around Moscow."§ At the Nuremberg trial evidence was given of the German procedure. One order issued to the troops was "to leave only a wasteland to the Russians". "Special incendiary and demolition detachments were organised to set fire or blow up dwellings, schools, theatres, clubs, museums, libraries, hospitals, churches, stores and industrial plants, so that only ashes and ruins should be left in the wake of the retreat." "Thousands of villages and hamlets, whole city blocks and even entire cities were reduced to ashes, blown up or razed to the ground."|| The Russian people did not rise against their rulers then, and their rulers did not call for terms.

### STRATEGIC TARGETS

What no nation at war can survive is the loss or critical curtailment of its means of making war. It cannot fight on if it is disarmed. It can be disarmed, as Germany was in the last war, not only by the destruction

\* Général P. Girardot, *L'Aviation stratégique, hier, aujourd'hui et demain*, in *Revue de Défense Nationale*, November, 1952, p. 428.

† Alan Bullock, *Hitler: A Study in Tyranny*, 1952, p. 600.

‡ Drew Middleton, *The Defence of Western Europe*, 1952, p. 159.

§ D. D. Eisenhower, *Crusade in Europe*, 1948, p. 512.

|| *Trial of German Major War Criminals*, P rt 7, H.M.S.O., 1947, pp. 211-3.

of its war factories but also, and perhaps still more effectively, by that of its network of transportation and its oil resources. It was the attack on these two types of objectives which robbed the German armies of their mobility in 1944-45. "The dismantlement of the railways and the lack of oil made impossible for the German armies all movement of any importance."\* Russia is even more vulnerable than Germany was in the two respects that are in question. Reference has already been made to her railways. Her oil supplies are no less insufficient for her needs. "Oil may well be Russia's economic Achilles' heel."† The Soviet Union's crude oil production in 1952 was 47,000,000 metric tons, which was only half of that of Venezuela (95,000,000 tons) and not much more than one-seventh of that of the United States (310,000,000 tons). The total production of the free world in 1952 was 562,850,000 metric tons, of which the Middle East produced 106,120,000 tons; that of Russia and her satellites in Europe and China was 55,290,000 tons.‡ The disparity is probably as good a measure as any of the ultimate hopelessness of a struggle by the Communists against the free nations. It could not be rectified by synthetic production. In the last war the combined output of the three hydrogenation and six Fischer-Tropsch plants in the Ruhr before they were bombed did not exceed 1,200,000 tons a year, which was 30 per cent. of the total synthetic production in Germany.§

The armament factories which Russia has been at pains to foster in the satellite States are also very vulnerable. In eastern Germany there are a number of plants producing aircraft instruments, radar equipment, optical, and other electrical precision instruments. There are others in Poland and Hungary, but it is in Czechoslovakia, which has the best engineers and technicians among the satellites, that the manufacture of armaments for the Communist *bloc* has been organised on the most striking scale. The Skoda works at Plzen employ 35,000 people, as many as at the peak of pre-war production. There are other armament works at Brno, at Most, Kladno, and Usti (all three north-west of Prague), at Stratonice and Janonice (south and south-west of Prague, respectively). Czechoslovakia has, in fact, been "built up at high speed as the Kremlin's western armoury."|| The country has become a straggling edition of the Rhur, and, like the Ruhr, it can hardly escape becoming a catchment basin for bombs in a new war. The unfortunate Czechs may live to rue the day when they linked their fortunes with their big neighbours to the east.

The aircraft factories both in the satellite countries and in Russia itself are likely, too, to be dealt with as the German aircraft factories were in the great assault upon them by the American Army Air Force in February, 1944. Factories have been established in Siberia—at Irkutsk, Tomsk, Novosibirsk, and elsewhere—but those of the last war in European Russia are still the main sources of aircraft supply. Moscow, Leningrad, Taganrog, Voronezh, Zaporozshe, Kharkov, Gorki, and Kasan are the

\* Lieut.-Col. P.P. C. Postel, *La Bataille Aérienne d'Allemagne*, 1947, p. 132.

† John Fischer, *America's Master Plan*, 1951, p. 195.

‡ *Industrial Survey: World Oil Production*, 1952, Central Office of Information, London, January 12, 1953.

§ Norman J. G. Pounds, *The Ruhr*, 1952, p. 155.

|| Lieut.-Col. J. Baker White, M.P., *Russia's Western Armoury*, in *Journal of the Royal United Service Institution*, November, 1952, p. 530.

chief producing centres. They would be well within the range of Allied bombers operating from bases in western Europe. Attack upon them would have the twofold purpose of reducing the enemy's capacity for carrying out raids on the Allies' centres and of drawing off Soviet fighters from the field of operations and thus relieving the pressure on the Allies' defending forces.

### RUSSIA'S GREAT DAMS

To the types of objectives referred to above there can be added another which also has a strong claim to priority in a bombing programme. The French authority, M. Camille Rougeron, has drawn attention to the vulnerability of the great river barrages which the Soviet Union has constructed or has planned in Asia. The fact that the attack on the Mohne and Eider dams on May 16, 1943, amounted only to a "half-check," as he calls it, should not lead to a neglect of this type of objective in another war.\* He points out that the Russian dams are of flimsy construction as compared with those in Germany. A Soviet barrage, he explains, differs from a western European or American one in being immensely long and in enclosing what is almost an inland sea behind it. "The dams of the Volga, and those of the Obi, the Yenisei and the plains of central Asia combine the maximum of extent with the maximum of fragility."† The giant dams serve three purposes: inland navigation (to relieve the overworked railway system), production of electric energy, and irrigation of cultivated areas. The most impressive is the gigantic system known as the *plan Davydov* which already harnesses or is to harness the waters of the rivers flowing from Siberia to the Aral and Caspian Seas. An enormous stretch of water, the "Sea of Siberia," is being created from the waters of the Obi and Yenisei; it is about half the size of France. "The weak point in this ensemble of giant works is evidently the dam of some hundreds of kilometres which will retain the waters of the Obi and Yenisei. . . . The objective, a thousand kilometres from the Arctic Ocean, is very well placed for attack from the north."‡ M. Rougeron states that while the dam takes ten years to fill, it could be emptied in a few hours. The effect would be not only to interrupt the navigation which the inland "sea" makes possible but to doom to infertility an enormous region of central Asia which depends on irrigation. All the industrial centres which draw their power from the hydroelectric plants connected with the dams would also be put out of action. Both these kinds of installations were objectives of the French air arm in Indo-China. It was reported in January, 1953, that Privateer bombers had attacked a large irrigation barrage in the Than-Hoa delta region, and that several installations of this kind had already been destroyed in the northern territory of Viet-Nam; an important pumping station north of Hanoi was also stated to have been destroyed by Bearcat fighters.§ Power plants as well as dams are likely to claim the attention of the American heavy bombers in a future war. Successful attack upon them should have a damaging effect upon the enemy's war effort and his economy as a whole.

\* Camille Rougeron, *Destruction des Barrages, in Forces Aériennes Françaises*, December, 1952, p. 355.

† *Ibid.*, p. 357.

‡ *Ibid.*, p. 361.

§ *The Times*, January 14, 1953.

## A SWIFT DECISION IMPROBABLE

It is not to be expected that the destruction of these various types of objectives will result in a speedy victory in the event of a war between the Atlantic Powers and Russia. The effect would not be felt for some time; strategic bombing, like blockade, acts through attrition. The ground fighting might go on in spite of it, and upon it the decision would depend, though it would be contributed to materially by the air action. To suppose that the latter action would make the fate of the encounter of the armies a matter of minor importance would be unwise in the extreme. On the ground the western Allies still have deficiencies to make good. The line is not strong enough yet. They have not reached the stage at which in an American trial the defending lawyer, ending his cross-examination, says: "The defence rests." There can be no rest yet for the western defenders of the wall. It can be held only if forces of the outer as well as of the inner ring help to man it. The States of the outer ring, being oceanic, are not themselves in danger of being overrun, but they cannot afford to dissociate themselves from the fortunes of the States that are. The greatest of the oceanic States, the United States, depends on some of the countries of the inner ring for a number of vital materials for her war production. She has to look to them for her requirements of tin, natural rubber, chrome, manganese, hard fibres and asbestos, as well as for additions to her own supplies of copper, lead, zinc, tungsten, and uranium. She could not exploit her enormous war potential fully without her friends' co-operation. She has need, too, of the naval and air bases which they can provide. Enthusiasts of the blue sky school would deny that this is so. They would contend that the United States' own bases would suffice for her needs. They would point out that from Thule, the great air base which she has established on the west coast of Greenland, jet bombers could reach the new industrial centres in the Volga region, in the Urals, and in Siberia, as well as the copper mines at Lake Baikal, in five hours' flying time *via* the North Pole. "Direct interhemispheric warfare" is Major de Seversky's prescription for victory for the United States. He devotes a chapter of his last book to showing that, besides being unnecessary, "Overseas Bases are Untenable."\* Even he, however, does not claim that global bombing would produce a swift decision. "A future war," he says, "will not necessarily be decided in one wild atomic flash."† And not many would support his view that the United States can do without bases in the eastern hemisphere. "Without the bases and facilities of our partners in western Europe," says Mr. Walter Lippmann, "the strategic air force would be like a high-powered automobile in a jungle country where there are no roads."‡ That is evidently the view of the United States Government. It is establishing a great ring for heavy and medium bombers all round the perimeter of Eurasia. The Americans are not coming there merely for a game of ring-a-ring-of-roses with their Russo-Chinese playmates. Eurasia is going to be enfiladed from the air.

\* A. P. de Seversky, *Air Power: Key to Survival*, 1950, pp. 23-6.

† *Ibid.*, p. 57.

‡ Walter Lippmann, *Public Opinion and Foreign Policy in the United States*, 1952, p. 40.

## THE LONE HAND IN THE AIR

It is conceivable that if the United States were *alone* at war with Russia she might put all her military effort into the air. She would be a free agent then. She would not have to concern herself with the buttressing of a ground line of defence. She could strike at Eurasia from two sides—from the Arctic circle and from the Far East—without passing over any other State's territory. Her bombers have, and will probably continue to have, a greater radius of action than Russia's. The bombs which they carry will probably be more destructive. Freed from all pre-occupation with the manning, equipment, and maintenance of other arms, she would have it in her power to create a mammoth Air Force compared with which that contemplated in the present target of 143 Wings would seem to be of almost negligible strength. With her manufacturing capacity devoted to that single purpose, she could build a juggernaut of air power that would grind an enemy to powder. She could do it, but she will probably not do it. It would be a gamble even then and there could be no certainty about the outcome of it. We, too, in these islands should not let ourselves be lured by the will-of-the-wisp of a lightning victory. The next great war may prove to be, as the former wars did, a grim test of endurance. We came near to being starved out in 1916-17 and again in 1941-42 because we had not made adequate preparations against such a danger. We must not let our enemy in a new war find it a case of "third time lucky".

J. M. SPAIGHT

## CHAPTER XXX

### AIRCRAFT DEVELOPMENT

BY GROUP CAPTAIN G. W. WILLIAMSON

#### SUMMARY OF PROGRESS

THE PACE of progress towards adequate defence against aggression has made, during the past year, a greater forward leap than ever before, in peace or war. Even the accidents are becoming typical of the age of jet and radar: Displays at both Farnborough and Detroit were marred by disintegration of aircraft in the act of pulling out of a power dive at low altitude in turbulent air; and one of the newest American all-rocket fighters, equipped to fire its rockets automatically as the sights come on, unfortunately became electronically locked with the parent aircraft, and shot it down instead of the target.

However, on the other side of the balance sheet, production and development have been marked by high spots which show some of the trends of to-day, such as the 1953 U.S.A. budget of twenty billion dollars for Air Force, Army, and Navy aviation. In the United Kingdom, the development of a delta bomber, the Avro Vulcan, is unique. It may soon be followed by delta transports, troopers, and air-liners.

Barely a year ago, there was only a single "Atom Bomber," the Boeing B-47; it was built about 1947, and several years ago proved itself capable of 600 m.p.h. speed and 50,000 feet altitude, together with a sufficiently capacious hull to carry the large atom-bomb of those days. Nowadays, there must be more than a dozen aircraft of this type, including the Avro Vulcan, the Handley-Page Victor, the Short & Harland S.A.4, and the Vickers Valiant; and the English Electric Canberra for that type of atomic bomb which is referred to in U.S.A. as the "a" bomb.

Atomic weapons have been developed which may have tactical applications, and it is believed that something is available which could be carried by fighters.

A number of aircraft and engine manufacturers in U.S.A. are jointly concerned with the development of atomic engines and the aircraft which they will propel; and it seems likely that similar projects, at present secret, are being developed in the United Kingdom. American journals say that the British effort will take the shape of a very large delta airframe; and that the designs of our atomic engines are at least as much advanced as in the U.S.A.

In both countries, fighters have become far more formidable and far more costly; super-priority orders have been placed for two British day fighters, the finest of their kind in the world, Hawker Hunter and Supermarine Swift. Both are very shapely, capable of very high speed, heavily armed with four 30-mm. cannon. They differ in design, it is said, in that the Hawker Hunter may cost less, is generally of sheet metal and detail construction, and may be somewhat the faster; while Supermarine Swift was originally intended to use a larger proportion of forgings, will be more expensive on account of the machining of integrally stiffened components,

and may have a longer range. Though in small numbers it probably costs more, it may be more suited to mass production as in war.

In U.S.A., the Lockheed Starfire was the first of the automatic aircraft which can home on an enemy, and discharge its rockets as the sights come on, even though the pilot may have failed to see the target aircraft. Other British and U.S.A. fighters are being armed almost solely with rockets; the electronic devices in both countries will be limited in quantity by the very high cost, perhaps 25% of the cost of the fighter, and by the availability of electronic manufacturing capacity unless in both countries some of it is taken away from television.

In a lecture delivered in February before the Belfast Branch of the Royal Aeronautical Society, Mr. R. E. Harvey, Director and General Manager of Short Brothers & Harland, dealt with the enormous increase in the costs of both fighters and bombers, partly due to the adoption of production methods which would provide very large output in quantity, at vast expense where only small orders are being placed. The increasing costs of fighters in particular, especially those with two jet engines, are so great that this trend may exercise an influence towards a preference for single engined fighters, the more so as a new World's record of practically 700 m.p.h. was recently set up by an ordinary fully-equipped North American Sabre, breaking its own record of 670 m.p.h. which had stood for several years.

In both U.S.A. and U.K. the same cost problems have resulted in projects for what have been styled "light fighters." The proposal is not a new one, and was mentioned as far back as 1934. The answer then, from the point of view of the Air Ministry, was the same as at present; in air fighting, quality is preferable to quantity; a small number of North American Sabres, up to the present, have been able to account for a large number of MiG-15. A Lockheed pilot, with experience of air fighting in Japanese waters, said enthusiastically of his latest type of tested aircraft, "If I had this aircraft during the war, I could have been a one-man air force." At least in the United Kingdom, the highest quality rather than the largest quantity must still be our aim.

But in both countries, there are projects for light-fighter types; in the United Kingdom, at least one has been mentioned, the project for a fighter made by Folland; aviation journals in U.S.A. aver that the Short & Harland S.B.5., with wings of variable sweep, may be a scale model for an English Electric light fighter. At least four firms in the U.S.A. have been concerned in a competition to determine the best type of light fighter; the betting seems to be on the North American project, though this may be only guess-work.

The tactics of jet fighting, whether in Korea or elsewhere, have somewhat altered as a result of the development of British methods of refuelling in flight; of the two methods at present in use in the U.S.A., one is similar to the original British design produced by Flight Refuelling Limited. An American fighter recently took off from a Japanese base, spent all day on the Korean Front with eight refuellings, and returned to Japan having spent over fourteen hours in the air. The refuelling in flight of fighters, bombers, and transport aircraft is becoming commonplace,

When Sir Frank Whittle, so long ago, visualized the first jet engines, he had in mind (as well as in his secret patents) a development which is

only just emerging as an actual engine type: it is the Rolls Royce Conway by-pass engine, in which a proportion of the intake air by-passes the combustion chambers and is delivered into the exhaust to combine with fuel which would otherwise remain unburned. Use of air in this way results in increased power without increase of blade temperatures, and increased economy of fuel.

Another high spot in the development of turbine engines is the actual production of Bristol Olympus, with the disclosure that higher compression and greater fuel economy is obtained by the use of two axial compressors, each driven by its own turbine, instead of one. In relation to the frontal area, the power of this very long turbine is greatly increased; and the fuel consumption begins to approximate to that of gas turbines driving propellers, a consumption now comparatively close to that of a large piston engine. But this favourable fuel consumption can be obtained only under favourable conditions, high speed at high altitude: as a type, this engine will be wonderfully useful for jet liners, provided that a new technique of landing, instead of stacking, is devised. A pair of Bristol Olympus engines has been installed in an English Electric Canberra; at 600 m.p.h., the pilot will have 32,000 h.p. under his throttle hand, making this Canberra the most powerful twin-engined aircraft in the world.

Although the Saunders-Roe Princess emerged from its hangar and flew, it does not appear that very much other progress was made, in flying-boat development or manufacture, on this side of the Atlantic; flying-boat designers in U.S.A. continue to produce not merely designs, but full-scale aircraft in flight, of novel and sometimes unique construction. The most striking of these is the development of skis for water-based aircraft. In flight, the ski or hydrofoil is flush with the planing bottom of the flying-boat; and is extended on struts before a landing is made. The two hydrofoils take the shock of first contact with the water. Though only of small size, their lifting effect in water is 800 times as great as the lifting effect of aerofoils of similar size in air. For take-off, the flying-boat begins to move forward, and as speed increases, the hydrofoils are extended until they are skating across the surface of the sea. At the time of writing, no comparisons of take-off speeds are available; but sufficient orders are being placed in U.S.A. to warrant the assumption that this type of flying-boat construction is here to stay.

In U.S.A., there is nothing new in the idea that a good bomber aircraft might make a good airliner; in this country we have experience with the Avro Lancaster, though accommodation was small. But in both countries, the importance of high-speed trooping, and the still greater importance of the continued supply of jet aircraft to the airways, has resulted in designs for passenger-carrying jet aircraft developed from existing bombers. There are proposals for modification of Vickers Valiant, and Avro Vulcan, and Handley Page Victor, all stated to be projected of a sufficient size to carry one hundred to one hundred and fifty passengers. This is only one of the developments which, it is hoped, will provide us with a good export trade in airliners for years to come: Comet, Britannia, Viscount, and then the new jet-liners projected by Avro, Vickers, Handley Page, and de Havilland with Comet 4.

There has been little change in the development of large helicopters, with the single exception of the enormous Hughes XH-17, doubtless



intended for bridge work; it looks like an immense straddle-truck, and is said to be able to lift 10 tons. It is powered by two General Electric gas turbines, the jets from which emerge at the tips of the propellers, which together span 180 feet.

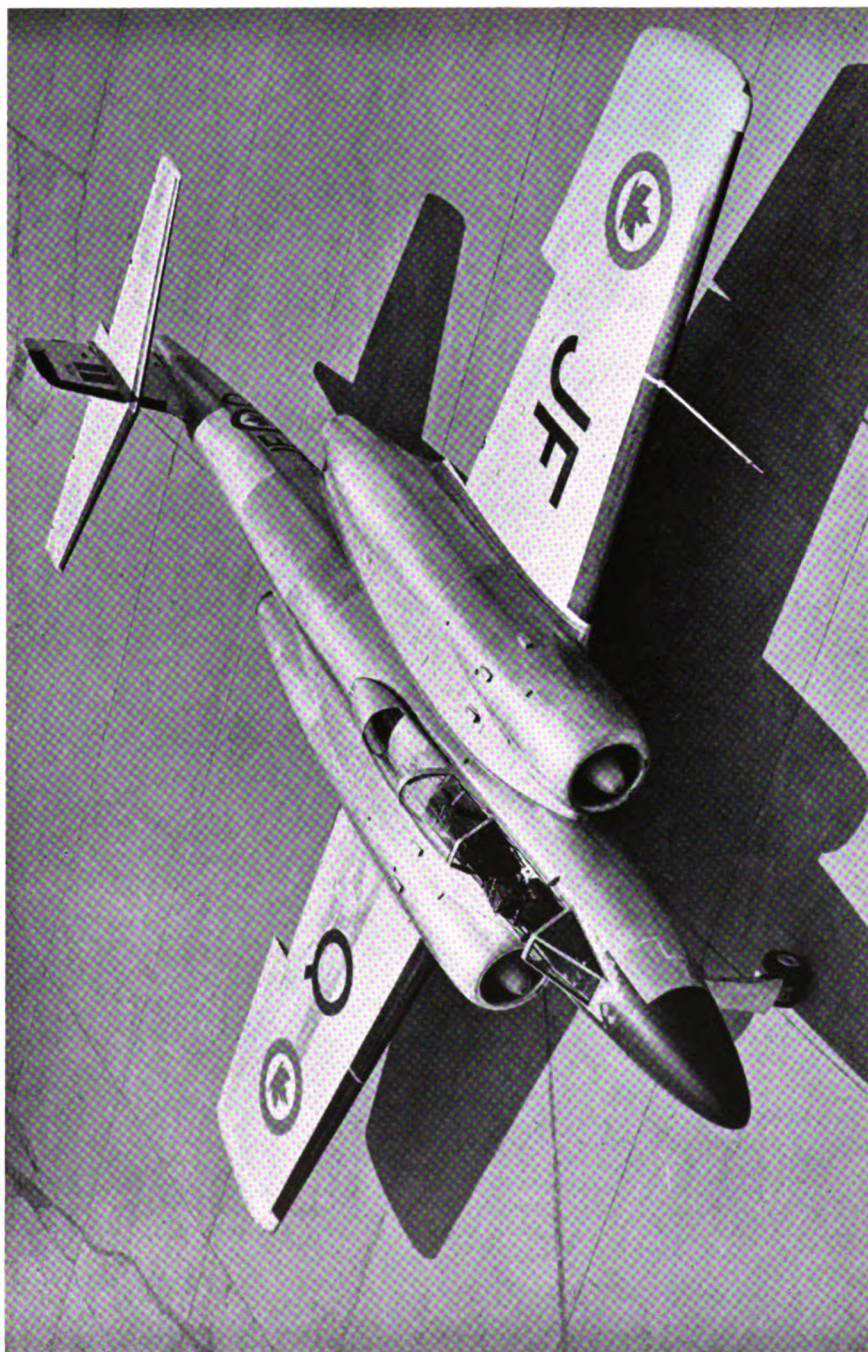
In armaments used for air combat, air to air, air to ground, or ground to air there is a trend towards the use of rockets rather than bullets or shells; on both sides of the Atlantic, the guided missile is being made in very large numbers, and several types have been designed not only to home upon the enemy, but to be detonated by means of a proximity fuse.

Military research on airframes seems to have been overtaken by military development, in the shape of the delta-bomber, though it is known that this well-proved design results from years of development, including experiments with Avro 707, 707a, and 707b. In several firms, experiment is still proceeding on various types of wings with variable sweep; some American aircraft such as those made by Grumman and Republic, as well as the Bell X5, have variable sweep wings which can be adjusted in flight; and pilots have spoken of the great increase in speed, which can be felt as well as being indicated, as the angle of sweep-back increases. In this country, Short Brothers & Harland have produced an experimental aircraft, S.B.5, designed by Mr. David Keith-Lucas, in which variations of sweep can be brought about by adjustments made on the ground. American journals inform us that this variable-sweep single seater may well be the prototype of a "light-fighter" possibly produced by the English Electric Company Limited.

### APPLICATIONS OF NUCLEAR ENERGY

If the Cold War were to give way to a less menacing atmosphere, both Russia and the Western Powers could devote more money to better living conditions and less to the production of atomic weapons. The most important applications of nuclear energy would then be in the field of electric power generation on land, and means of propulsion at sea or in the air. At least two atomic engines are believed to be in existence, both for submarines; and in July, 1952, one was exhibited in the Pentagon. It consists of the nuclear reactor in which the diluted energy of a chain reaction is transferred by molten lead to a boiler providing steam for a turbine. When used in a submarine or aircraft-carrier, the steam turbine will drive propellers; and it seems likely that the first nuclear propelled aircraft will also be driven by propellers in the form of ducted fans. This means only that the propeller will be of small diameter, running at high-speed in a tunnel or duct. A ducted fan will doubtless supply the by-pass air in the Rolls Royce Conway gas turbine; it would be quite possible to apply this technique to aircraft at present, with a gas turbine driving a propulsive ducted fan in the tail of the engine, instead of a tractor propeller in the front as at present in the turboprop, or a reaction jet at the tail as in any jet engine.

In articles written during the last year or so by three leading flying-boat designers (Mr. Ernest Stout of Convair, Mr. Henry Knowler of Saunders-Roe, and Mr. Keith-Lucas of Short Brothers & Harland) it was pointed out that the chief difficulty about the nuclear engine in aircraft would be



Avro Canada CF-100 Fighter



the great weight of the concrete or lead shield to protect human beings against the deadly gamma rays emanating from radio-active material; in his lecture to the British Association in September, 1952, "THE SHAPE OF WINGS TO COME," Mr. Keith-Lucas said:

The atomic powered air liner might be a possibility to-day, but it would have to be extremely large and would probably be uneconomical on account of the enormous weight of the screening necessary round the reactor unit. We could argue from that single premise that the aircraft ought to be a flying boat because of the high landing weight which, on a landplane, would mean a heavy undercarriage and the need for airfields with exceptionally long runways capable of taking very heavy loads. All of this is an expense which the taxpayer would be glad to dodge. The reactor unit and engine would be in the hull of the boat and the passengers would have to be housed in the wing or in the wing tip floats.

In U.S.A., manufacture of aircraft intended for nuclear propulsion has been entrusted to Convair and Fairchild; American publications refer to the possibility that in this country the first nuclear propelled aeroplane would be a delta shape, and they also aver that a British nuclear engine for aircraft is more advanced than theirs, despite the vast quantity of work carried out by various manufacturers on behalf of the United States Bureau of Ships.

Consolidated Vultee, pioneers of delta aircraft in the United States of America, are also makers of flying boats; recent lectures by their Chief Designer have been illustrated by sketches showing supersonic aircraft of pronounced delta shape; and these illustrations include sketches of flying-boats with very high ratio of length to beam, at least 15 to 1 as compared with the Short Sunderland about  $4\frac{1}{2}$  to 1. If Convair are really producing the nuclear energy airframe as a flying-boat, it is certain that the Fairchild project will be a land aeroplane. The Fairchild idea of a detachable hull has been referred to in previous Volumes of Brassey, and the whole of the fuel in one modern aircraft of this design is carried at the wing tips; one might speculate that in a very large aeroplane something similar might be designed for the carriage of passengers, as originally suggested by Mr. Keith-Lucas.

During the year, the names of other firms in the U.S.A. have been put forward as having been entrusted with designs for nuclear turbines: the earliest contracts were placed with General Electric, and Pratt & Whitney; to these may possibly be added Westinghouse, Allis Chalmers, and the great airframe firm of Boeing, who have been making experimental turbines for years. Whether this be so or not, practically every very large aircraft firm in the U.S.A. is setting up nuclear laboratories costing millions of dollars, and this great expenditure combined with the furious energy with which the U.S.A. attacks the most insoluble problems is bound to result in rapid progress in the production and control of nuclear energy. As regards Government expenditure, \$33,000,000 are to be spent on an aircraft reactor ground-test base at the National Reactor Ground Testing Station, near Arco, Idaho.

Within the last few years, dozens of books and scientific reports on this subject have been produced; and it seems possible that developments may be sufficiently rapid for a nuclear propelled aircraft to be flying within five years. This may be a heavy bomber, or a flying-boat, with a gross weight of 500,000 lbs.

Nuclear energy may be spent rapidly or slowly:

- (i) As in the atomic bomb, the heat of the splitting of atoms may be expended in a single second, producing temperatures and energies measured in millions of degrees, kilowatts, or horsepower.
- (ii) At the other end of the scale, the reaction of a pound or two of the right kind of uranium might be spread over 100 hours, and would drive a 250 ton aircraft across the Atlantic twenty times.
- (iii) The nuclear-powered interceptor has been mentioned, capable of vertical take-off; it would be unmanned and possibly un-screened while in flight.

“Vertical take-off” means that an aircraft of this type might be launched from a ramp pointed upwards at an angle of  $45^{\circ}$  or  $60^{\circ}$ ; modern fighters, especially those intended for nuclear propulsion, will soon exert more static thrust than their gross weight, and could in theory be launched vertically like a rocket; but with a winged aircraft this is neither practicable or desirable. In U.S.A., consideration is being given to the use of what have been styled “expendable aircraft.” An example has recently been provided by an illustration in the British technical press of a railway tunnel in North Korea being blown up by an unmanned Grumman Hellcat carrying a load of explosive, directed to its target by remote control, aided by a television camera on the Hellcat and a television receiver on the piloted aircraft. This technique will be more fully used if nuclear-powered unmanned fighters are produced: even to-day, certain operations prior to the launch of a very large rocket are observed by television, and this would be equally necessary with an unshielded nuclear engine, whose radio-active fuel might be inserted, so to speak, at the last possible minute by mechanical hands. An interceptor of this type, whether its energy is applied to a ducted fan or to a re-action jet, could roam the skies for hours before its radio-active fuel became exhausted; and this feature will be one of the snags when landing nuclear-powered heavy bombers, which in any flight other than those in which bombs are dropped, will necessitate landing at approximately the same weight as at take-off. Hence the proposals that unlimited runways such as the sea or a large lake should be used.

During the year, the offensive uses of nuclear energy have extended no less rapidly than propulsive applications. On both sides of the Atlantic, the technical press speculates upon the availability of the hydrogen bomb, which depends perhaps not upon the splitting of atoms, but upon their fusion: to take a chemical analogy for a physical phenomenon, hydrogen and oxygen burnt together produce a few drops of water with explosive energy; and it is possible that the American bomb tried out at Eniwetok last year was of this type. It is said to be, in proportion to equivalent weights of other radio-active material, ten times as powerful.

The other bomb development has been in the opposite direction: in U.S.A., it would appear that tests are in progress either of reduced weights of material or of diluted explosion, forming the basis of a small atomic bomb for tactical purposes. Its effort has been measured by statements that it was equivalent to 15,000 tons of T.N.T., and that the effect was lethal at less than two miles. This is doubtless the smaller bomb, which

could be carried by tactical aircraft such as Canberra and some of the large all-weather fighters at present being produced in U.S.A., under-engined by British Standards. Articles re-printed from French technical journals refer to this development as the "a" bomb.

Its effect can be compared to the largest bombs available at present: if an atomic bomb is lethal up to two miles away in every direction, a larger bomb lethal over ten miles radius will also be lethal ten miles high; and this leads to the proposal that future atomic weapons would have to be delivered by pilotless bombers, perhaps launched at very great height capable of speeds of the order of 1,500 m.p.h., and possibly controlled by some combination of televised radar. They will be very expensive weapons, and life in Europe would be the happier if great powers were to decide to abandon the possibility of their use.

To sum up, nuclear propulsion is probably less than five years away; tactical bombs seem to be available, and could be carried by fighters; both fission and fusion bombs seem to be available, and increase rapidly in lethal effect and cost. This vast expenditure might become unnecessary if all the Great Powers concerned were to expend, upon the problem of future war, intelligence rather than emotion.

### MEANS OF PROPULSION

In this vintage year of development, British designers produced two unique jet engines; one of them, the Rolls Royce Conway by-pass engine, appeared in a patent specification 17 years ago, being one of the many with which Sir Frank Whittle and Power Jets Ltd. together covered the gas turbine field. The other is Bristol Olympus, provided with two independently driven compressors; this results in high compression ratio, great flexibility of response throttle opening, and low specific fuel consumption. From its design, it seems likely that the Rolls Conway will also prove to be a very economical type of turbine; and it is therefore likely to be used in jet transports of the future, resulting from modification of existing bombers including the Avro Vulcan.

Little or no information has been revealed, at the time of writing, about the Rolls Royce Conway; but there is no reason to doubt the fact that it corresponds in general outlines to the patent specification of 1936. The idea of the invention is to provide the largest possible flow of air through the turbine, with the lowest possible velocity for a given thrust.

When a propellor driven aircraft is in flight, the propellor thrusts behind it about 10,000 lbs. of air per lb. of fuel consumed; the average jet engine exhausts, at much higher velocity, little more than 70 lbs. of air per lb. of fuel; there is no doubt that Conway will prove to be very much more efficient in fuel consumption, due to an increase in the weight of air accelerated behind the aircraft, as compared with other types of jet engine.

The principle of the Rolls Royce Conway is simple; the air enters the intake with a certain amount of ram velocity, and its speed is greatly increased by a ducted fan, directly coupled to a turbine in the exhaust space; this fan corresponds to a low pressure compressor; after the fan, a proportion of the air passes through an axial compressor into the combustion chambers, and is exhausted first through a turbine driving a high pressure



compressor, and secondly through the blades of the other turbine driving the ducted fan. The fan and this second turbine are connected by a shaft passing coaxially through the centre of the hollow shaft which connects the main turbine and the main axial compressor.

The other portion of the divided air stream by-passes the combustion chambers and enters the exhaust stream after it has passed both turbines; the addition of this air increases the mass flow from the jet, and reduces the velocity, so that its reaction becomes more efficient; it was the intention that this device should accelerate three to five times as much air per lb. of fuel as the conventional jet engine.

On page 315 of INTERAVIA for June, 1952, reference is made to the Power Jets Patent 471368 of 1936, which probably describes something like the Rolls Royce Conway engine; on the next page, a small picture purports to show the method of working of Bristol Olympus, an illustration which does no justice whatever to the enthusiasm of the axial minded compressor designer: i.e., the diagram shows an axial low pressure compressor succeeded by a centrifugal compressor, instead of by an axial high pressure compressor. About the same time, the Editor of Flight was permitted to see the Bristol Olympus running, and, as a war pilot of distinction, was permitted to operate the throttle. His report, in Flight of July 4, 1952, surmises that there might be six or seven low pressure stages of compression, and eight high pressure stages, as compared with a total of nine in Rolls Avon or thirteen of Armstrong Siddeley Sapphire. As with the Power Jets by-pass engine, and probably the Rolls Royce Conway, the two compressors are driven by two turbines, the shaft of the aftermost one passing through that of the forward turbine.

It was announced as far back as June, 1952, that Olympus delivered 9,750 lbs. of static thrust, which makes it by far the most powerful and economical jet engine in the world, taking into account its advanced stage of development. Consumption is stated as 0.766 lbs. of fuel per lb. of thrust per hour; this figure will be greatly improved upon as increased thrust results from further expansion and possible modification.

In view of the great increase in compression ratio obtainable by means of compound-compression engines, with two compressors in series, it may be possible for jet engines to dispense with the ram effect obtained by mounting them in the leading edge; and during the year Rolls Royce announced a patent whereby the jet engine could be mounted in the trailing edge of the wing, aspiration by suction from some point at which the air might be flowing either in the right direction, or at least, not too strongly in the wrong direction. About the same time, Rateau announced a patent which would similarly permit the engine to be mounted far aft instead of in the leading edge; it is intended that the jet engine should be aspirated by suction from a number of openings in the surface of the wing, at which the boundary layer might be subject to critical change. Not only that, but the openings are shown as controllable; each is monitored by a tiny pitot, which doubtless emits a feeble cry when an over-turbulent boundary layer demands that this particular opening should be "milked" by the aspiration of the engine.

Jet engines of the type which may be built into the trailing edge instead of the leading edge are of more interest to us than they would be in the U.S.A. As may be seen from illustrations of large American aircraft, or

even all-weather fighters, the tendency is towards having the engines in pods beneath the wings; this has three advantages:

- (i) Maintenance, or removal of the engine, is easily carried out owing to its accessibility.
- (ii) the risk of damage to the main structure of the aircraft by fire is minimised.
- (iii) The intake and exhaust ducts are the shortest possible, thus minimising frictional air loss.

The tendency in this country is towards buried engines; their greatest disadvantage is, particularly in delta aircraft of the type now being built, that either intake duct or exhaust duct or both, may be inordinately long. Patents such as the above enable the builders of delta aircraft to design for short intake and exhaust ducts; and there is another great advantage in that sand or stones, birds or flight engineers, need no longer be sucked into the intake on the leading edge; at any rate, this tendency is reduced.

In addition to the two entirely new types of turbine, there has been a pronounced increase in thrust, without an increase in size, in large turbines on both sides of the Atlantic. The Rolls Royce Avon is a remarkable example: nine different Marks of this engine are being made, seven of them being of R.A.7 type, which has passed a 150 hour type test at a basic rate of 7,500 lbs. thrust; in addition, a similar type test has been completed on Avon RA.7R, which is equipped with re-heat, at a gross rate of 9,500 lbs. thrust: i.e., augmentation produces about 2,000 lbs. of extra thrust, by introducing additional fuel into the tail pipe. In this engine, it provides 25% additional thrust at take-off, and about 50% at 700 m.p.h. Admittedly, the total fuel consumption is much higher; but when applied to climb to altitude, it almost halves the time and considerably raises the maximum altitude. As the time of climb is halved so is the total expenditure of fuel for any particular altitude, and the net result is that the expenditure of fuel required to reach altitude is no more with re-heat than without it.

Although thrust ratings of existing engines have improved throughout the year in some of the larger types, there have been only one or two additions to Table VIII, showing the large all-jet turbines. These additions include the Bristol Olympus, and the Rolls Royce Conway; it is possible that Conway may soon be made by Pratt & Whitney, holders of licences for Nene and Tay, even if these arrangements have not already been made. It may be only a coincidence that their J57, of which nothing has been disclosed, is a two-spool engine of 10,000 lbs. thrust. Other duplicated engines are those made by Wright, who make a version of Armstrong Siddeley Sapphire styled J65, and Bristol Olympus styled J67. Licences of this type are wonderful dollar earners: it is stated that those for Tay and Sapphire, since the agreements were made, have brought us no less than \$12,000,000.\*

Other large jet engines include Avro Orenda, originally intended for Avro Canada Canuck; the Mark IV engine is understood to provide about 7,000 lbs. in thrust. This fine engine will also power the Canadian built

\* Aviation Report, December 23, 1952: Aviation Studies Limited, 29 Cheval Place, London, S.W.7.



North American Sabre, and may provide it with sufficient extra thrust to break the World's record again, if only by ten miles an hour, making 710. Another big engine is the larger version of American Westinghouse J40; it is rumoured that it will provide 10,000 lbs. thrust. Including the afterburner, it is becoming too long for the fighters for which this engine was originally intended. Pratt & Whitney are understood to have in hand a very large turbine of about 15,000 lbs. static thrust; it has axial compressors, and unless they are already making a version of the Rolls Royce Conway this will be their first venture into the axial field. The technical press, both in U.S.A. and U.K., continues to wage a wordy warfare in regard to the merits or de-merits of the centrifugal or radial compressors, patented by Sir Frank Whittle, in which the air enters at the centre of the disc, and is flung outwards radially by centrifugal force, thus securing compression prior to combustion. It is cheap and easy to make as compared with the thousands of blades in large axial compressors. For this reason, and perhaps also because they had a number of Derwents and Nenes, the Russians have made thousands of centrifugal-compressor engines derived from the Rolls Royce Nenes, supplied to them a few years ago. The disadvantages are that high compression ratios may require, in single stage centrifugal compressors, greatly increased frontal area. The greatest disadvantage of the axial compressor is the high cost of making so many blades; but compression ratio and economy of fuel is attained with small frontal area, and increased by extending the length rather than diameter. It would appear that both in this country and in U.S.A. there will be a trend away from the simple centrifugal towards the expensive but economical axial type of engine. Dealing with the engines in Table VIII, centrifugal or radial compressors are used by Rolls Royce Nene and Tay, de Havilland Ghost, and Nene and Tay as made by Pratt & Whitney; all others are axial. Rolls Royce have turned from centrifugal to axial, in the Avon; de Havilland, according to American journals, are making a 15,000 lb. axial; and Pratt & Whitney, if they are not already making Rolls Royce Conway, have in their J-57 produced a large jet turbine with high pressure and low pressure axial compressors.

American technical journals claim that although in this country we lead the World in jet designs, the best turboprop engines are found in U.S.A. So, although there is little change in Table VII, the most important newcomers are two large engines of more than 10,000 equivalent shaft horsepower, adding the jet thrust (small in a turbo-prop) to the horsepower delivered to the propeller. One of these is the Curtiss-Wright development of the Armstrong Siddeley Sapphire jet engine, modified for use as a turboprop, and styled Typhoon; and the Pratt and Whitney double engine consisting of two T.34 turboprop engines, styled T.48. Both are capable of exerting 10,000 h.p., double the output of any British turboprop with the exception of the Double Proteus.

Government orders in U.S.A. for engines or aircraft are identified by a letter, not necessarily an initial letter, to identify the type: in aircraft, B for Bomber, F for fighter, T for trainer, in both U.S.A.F. and U.S. Navy; in engines, J for jet and T for propeller-turbine. In addition, there is a serial number allotted when the order is placed. From these numbers it is possible to compile a checking list of engine and aircraft types, from which one can determine which types are no longer reported as progressing

favourably, and which numbers, not apparently allotted, might correspond to nuclear engine or atom-bomber. Such lists are regularly compiled by Aviation Report, which points out that even numbers refer to Navy projects, and odd numbers to U.S.A.F. engines. The list shows that, of the big engines, the following turboprops are obsolete: T.35, Wright Typhoon, 10,000 h.p.; T.37, Turbodyne, 10,000 h.p.; and T.42, a de Laval project, not necessarily a steam engine.

One new British turboprop has constrained American engineers to compare fuel consumptions of their engines with ours, and Aviation Report for March 3, 1953, shows that the specific consumption of Napier Eland at altitude is as good as piston engines such as Bristol Centaurus or Pratt & Whitney CB.17, and nearly as good as Wright Turbo-Cyclone, though weight per horsepower of Napier Eland is less than half that of the others. But all of them are put in the shade, as regards fuel consumption, by the improved Napier Nomad, mentioned on page 314 of the 1952 Brassey. The new engine is described in Flight of March 20, 1953: it is a 12-cylinder two-stroke diesel with horizontally opposed cylinders, exhausting into a multi-stage turbine geared to the propellor shaft. Take-off power is about 3,320 h.p., weight 3580 pounds, and fuel consumption at maximum continuous power at sea level only 0.36 pounds per effective horsepower per hour. With so much less fuel to be carried, a 140,000 pound aircraft (all-up weight) would have a payload of 21,700 lbs., 16,200 lbs., or 6,250 lbs. depending on whether the four engines on such an aircraft were Nomads, turboprops, or jets; on page 334 of *The Aeroplane* for March 29, 1953, a similar calculation shows the total cost of an aircraft to carry a payload of 25,000 pounds, over a still-air range of 2,860 miles—£623,000 if powered by jets, £520,000 with turboprops, or £491,000 with Nomads. Fuel weight with Nomads is about half that with jets, and on that account structure weight of the Nomad-powered aircraft is shown as about 25% less than that of the corresponding jet-liner.

The technical press has been pointing out the operating advantages, in first cost, simplicity, and cost of fuel, of the Big Twin aeroplanes, two engines rather than four; as bigger engines are less expensive per pound, and more economical per horsepower, we may see a trend towards bigger Nomads, and bigger turboprops. As regards the latter, Curtiss Wright of U.S.A. have produced a propellor, about 18 feet in diameter, for a 20,000 h.p. turboprop, not yet visible on the development horizon though it may be being built in secret. The largest turboprops announced are those of about 10,000 equivalent shaft horsepower shown in Table VII.

Jet engines, which also cost less per horsepower as they become bigger, are increasing in size for other reasons: in fighters, supersonic speeds in level flight may depend upon the use of small single-seaters with single engines instead of twins, and these speeds will need engines, now within sight, of more than 20,000 pounds static dry thrust, or perhaps 30,000 with afterburning. There is a tendency, at least in U.S.A. to use afterburning at take-off instead of rockets; the Allison J.71 develops 9,800 lbs. dry, and about 13,000 with afterburning, an increase of 33%. In Table VIII, other firms using afterburners include Rolls Royce in Avon, General Electric of U.S.A., Pratt & Whitney in J.48 Tay, Westinghouse in J.40, and Turbomeca in developments of Atar 101C.

## JET FIGHTERS

The development feature of the past year has been the application of increased engine power to existing airframes; but even now, when U.S.A. is beginning to produce jet engines at least as big as the British best, our own aircraft top the list in any calculation of the ratio of thrust to weight. In Tables I and II, that ratio is shown as growing larger as engine power increases; in U.S.A. the figure is usually stated the other way up, and styled "thrust loading," the weight of aircraft which each pound of thrust has to carry. Thus, if a single-engined jet fighter has an all-up weight of 20,000 pounds, and an engine capable of 10,000 pounds static thrust, loading per pound of thrust would be 2·0, but thrust per pound of airframe and engine would be 0·5. It does not follow that those aircraft with the highest thrust ratio will be the fastest, as clean lines and no excrescences have a great effect, but it is probable that rate of climb will be the highest.

Gross weight and thrust of secret British aircraft are sometimes publicised by American sources long before they are released in this country; thus, an article on the Folland light-fighter styled Gnat which appeared in *Flight* of April 3, 1953, says "the engine will be an axial turbojet"; but *Aviation Report* shows a Mark I and a Mark II Gnat, the latter weighing 5,300 pounds, with a thrust of 4,000 pounds. The all-up weight might be that of an empty shell, no fighter instrumentation, radar, guns, or ammunition. However, by guessing that the weight of Hawker Hunter and Swift is no more than say Supermarine Attacker plus 1,000 pounds for a bigger engine, the most powerful aeroplanes in the World, for their weight, are as follows: Gloster Meteor N.F.11, 0·76 lbs. thrust per pound of airframe; Gnat, 0·75; Hunter with Sapphire 0·66; North American Sabre and Douglas Skyray 0·55; Chance-Vought Cutlass and Swift with Avon 0·52; MiG-15, 0·50; de Havilland Venom and McDonnell Voodoo 0·43; and Avro-Canada Canuck or CF.100, with two Avro-Canada Orendas, 0·41.

In February of 1952, an article appeared in *Interavia* providing many more details of the construction of Supermarine Swift than had been released in this country, compiled from intelligent anticipation of the extent to which construction of Swift would be modified from that of Attacker; but its most interesting paragraphs were those which dealt with the genealogy of Hunter and Swift, as a pair, from great fighters of the past emerging simultaneously in pairs from the same two firms: Hurricane and Spitfire, Tempest and Spitfire 22, Sea Fury and Seafang, Sea Hawk and Attacker; the writer goes on to say:

These two fighters are among the most efficient in the world, thanks to their streamlined design, their super-powerful Rolls-Royce Avon engines, and last but not least, their armament consisting of four 30-mm cannon.

There is a trend in U.S.A. away from guns, though a high proportion of their fighters still have four 20 mm. cannon or six "fifty-calibre" or 0·5 inch cannon. An increasing number of fighters, as the result of experience in Korea, carry rockets on racks beneath the wings; but recent marks of North American Sabre, Northrop Scorpion, and Lockheed Starfire have no cannon, and carry rockets in streamlined containers, and, in Starfire, in the nose as well. Of Starfire, *Jane's All the World's Aircraft*

says "all-rocket armament comprising  $24 \times 2.75$  inch rockets housed in a ring of firing tubes around the nose; 1,200 pounds weight of electronic equipment, including automatic locating, tracking and firing instruments." Similar equipment in Northrop Scorpion is described as "electronic aiming and automatic triggering equipment." Aircraft so equipped are described as "automatic interceptors," in which the pilot is a passenger for most of the time. This idea dispenses with the radar operator, and with the need, apparently, for all-weather interceptors to have twin-engines.

The next step is the unmanned interceptor, which dispenses with the pilot as well: Hughes XF-98 Falcon is a tiny aircraft designed for air-launching from beneath a mother-aircraft, and which carries out its mission and returns to the control of the parent for further instructions in regard to landing; Boeing XF-99 Bowmarc is ground-launched, and like the Falcon, locks on to its target by radar, fires its own guns or rockets automatically, and returns to the control of its human monitor. Air control of one of these gadgets should be listed amongst the dangerous trades.

It will be noticed that the above two unmanned fighters are styled F.98 and F.99; as stated previously, Government orders run serially, as regards the allocation of numbers to aircraft types, and since, at the time of writing, the next four allocations are known, they may as well be stated as an indication of the trend: these four numbers are stated as supersonic fighters, North American, McDonnell twin-jet, Convair delta twin jet, and Republic delta single-jet; F.104 is an unspecified fighter order for Lockheed. The trend towards more delta-fighters is noticeable in U.S.A. British achievements like the Gloster Javelin twin-jet delta, and the Avro Vulcan delta-bomber, still give a good lead to the rest of the world.

Though there are many minor alterations in Tables I and II, no new twin-jet fighters have been announced in other than experimental stages; as regards single-engine fighters, Hunter F.2 with Sapphire instead of Avon as in F.1., is likely to be the fastest of day fighters, as Javelin with two Sapphires, each of 8,300 pounds thrust, must be the fastest of night or all-weather interceptors. It is likely also to be possessed of long range, as the delta structure permits of a considerable load of fuel without external tanks. Tip tanks on swept wing aircraft present special problems, and one French aircraft has been destroyed in an accident due to a tip tank tearing away in flight and striking the tailplane. North American Sabre carries extra fuel in braced underwing tanks mounted on pylons, and it is said (in U.S.A.) that Hawker Hunter will have Mosquito-type underwing tanks mounted flat against the wing surface.

Two newcomers to Table II are made on the Continent: the French *Mystère*, well reported upon by American military pilots, and the Swedish Saab A.32, *Lansen* or *Lance*: it fits its name, possessing clean and slender lines, but with weight and wingspan far greater, for its power, than Hunter or Swift. The same remark applies to *Mystère*; but in thrust ratio it is no worse than many of the American fighters, and the North Atlantic Treaty Organisation has placed an order for 260, from U.S. Funds.

The best summing up of future development is provided by a paper, read to the Derby Branch of the Royal Aeronautical Society by Squadron Leader W. A. Waterton, G.M., A.F.C., Chief Test Pilot of Gloster

Aircraft Company Limited, on March 12, 1953; it is entitled "Some Aspects of High Performance Jet Aircraft." He points out that supersonic speed in fighters is of a duration measurable in seconds, during a dive from high altitude at steep angles; and level supersonic speed may be a long way off. The most important requirement is the right plan-form, and it seems to be generally agreed that the delta outline provides the best compromise between low drag and high speed on the one hand, and on the other, controllability either at altitude or in landing; it is a compact form of sufficient strength to cover high air speeds, and yet provides ample storage space for equipment and fuel. Clean lines come before increased thrust, as the latter without the former result in a fighter which will be slow in manoeuvre; and speed records may be made by aircraft which are *not* fighters: "By cramming multiple engines in small, heavily laden airframes of limited fuel capacity, we may well achieve level supersonic flight by accepting high landing speeds, lack of manoeuvrability except at top speed, and very short range and endurance."

### JET BOMBERS

To quote Flight of September 5, 1952, the Farnborough Display in that year was "an occasion which promises to become historic—the first public appearance of the Avro 698 four-jet delta, superb example of British design skill, foresight, courage and workmanship. While in no way detracting from the many other magnificent performances, it has, nevertheless, stolen the show and opened the eyes of the world."

The British specification for a four-jet bomber was issued to four firms on January 1, 1947. It was, in effect, a specification for an "Atom-Bomber," to use a term which had not then been invented; in U.S.A. their schedule of requirements demanded at least 600 miles per hour, 50,000 feet altitude, and a bomb-bay big enough to take the huge atomic bomb of those days. The design work was begun in Seattle, on Boeing B.47, in the middle of September, 1945, and orders reached the workshops in June of 1946; the first B.47 was complete in only fifteen months, and flew just before Christmas of 1947. The first production Stratojet emerged in March 1950; 1,100 are on order, 500 have been delivered, and rate of delivery exceeds one per day.

A. V. Roe worked on their Vulcan project all through 1947, and all through 1948 studied the small deltas of the 707 series. Mockup of the big aircraft was completed by Spring 1950, orders began to reach the shops, and 28 months later the world's first delta-bomber took the air. Short S.A.4, the most conventional four-jet-bomber, flew in August 1951; it was preceded by Vickers Valiant, the first prototype of which flew in April 1951; and latest of the four, Handley Page Victor, flew on Christmas Eve, 1952.

Little more than two years ago, there was only one Atom-bomber, to use the term invented by the Saturday Evening Post; now there must be at least ten, including the British quartet, Boeing B.47 and the new 8-jet monster B.52, Convair B.60 and a modified B.36; English Electric Canberra for the "a" bomb, the Lockheed Neptune minelayer version, and Douglas XA3D weighing 65,000 pounds gross, capable of 600 miles per hour, and stated to be the very first carrier-borne aircraft equipped for atomic bombing; it is styled an "Attack-Bomber."

At the time of writing, little has been disclosed about any of these aircraft, though weights and dimensions have been estimated in American publications; for example, 100 feet span, and 120,000 pounds weight, for Avro Vulcan. However, the delta-bomber has all the virtues of the plan-form which is rapidly becoming epidemic in U.S.A. now that they have had time to evaluate Javelin and Vulcan. But if the passenger version of Vulcan takes off in the attitude of Javelin, seats will either have to face forward, or extra-strong seat-belts will be needed to prevent everybody from rolling down towards the tail. For landing, an Irving ribbon parachute is used: it is lighter and stronger than the standard type, and folds more neatly. At present, Vulcan is engined by four Rolls-Royce Avons, but will have Bristol Olympus engines in due course. The bogie type of undercarriage has come to stay, for large aircraft; and both Avro Vulcan and Handley Page Victor have no less than 18 wheels—eight on each main leg in two rows of four each, and two on the nosewheel. The undercarriage of Vulcan is made by Dowty, and that of Victor by Electro-Hydraulics Limited.

The Handley Page Victor will have four Armstrong Siddeley Sapphires, of about 8,300 pounds thrust each. It has wings of high aspect ratio, long in relation to the chord; the wings are well swept back, with the greatest sweep at the root where the wing is thickest; but with varying sweep along the leading edge so that the angle of sweep is least at the tips (where the wings can be at their thinnest anyhow) to minimise the possibility of tip stall at lower speeds. Along the leading edge, there are three variations of sweep, giving the appearance in plan of a line like the edge of a scimitar, or the flatter of the two curved lines which make a crescent.

The wings of Vickers Valiant, the first large British Bomber with sweep-back, are also more swept at the root, but without a curve quite so pronounced as that of Victor; the engines, at first, will be four Rolls-Royce Avons.

Consolidated Vultee, or Convair, B.36 is still the biggest bomber in the world, but will gradually be displaced by Convair's YB-60, an 8-jet swept-wing 180-ton bomber. U.S.A. designers prefer the thin wing, with engines and sometimes tanks hung on pylons; the thickness of B.60 wings, of 206 feet span, is not known; but those of B.36, which are 230 feet span, measure 7 feet 4 inches at the root. Orders for the earlier marks of B.36 are still running, parallel with modifications to bring those up to date which have been returned for overhaul. About 170 of the current type are on order; they are armed with sixteen 20 mm. cannon in eight turrets, all retractable except those in the nose and tail. The piston engines drive three-bladed, hollow steel propellers of about 19 feet diameter. One of these aircraft has flown 10,000 miles non-stop, dropping a dummy 10,000 pound bomb halfway; and another has carried and dropped two dummy bombs each of 42,000 pounds, a load of 84,000 pounds. This is the aircraft which has a pressurised tunnel 85 feet long between the forward and aft crew compartments.

No details have been disclosed in regard to Convair YB-60; or the other 8-jet global bomber, Boeing B.52. As jet engines increase in size, there are rumours that this or that 10,000 or 15,000 pounds thrust engine will replace existing engines; at least in these large bombers there will be space for a considerable amount of fuel, quite apart from the fact that

refuelling techniques for both bombers and fighters are well advanced in U.S.A. Boeing have their own patents; but there is a firm styled Flight Refuelling Incorporated which probably uses the British system. Some jet-tankers have been ordered, including a number of modified Boeing B.47 bombers.

The fuselage of the jet bomber B.60 is 171 feet long, about nine feet longer than that of B.36. Apart from this variation in dimension, the two fuselages look very much alike in available photos, and even the nose wheel seems to come in the same place in each. Possibly much of the B.36 hull structure has been used in B.60: Convair say "YB-60 was built in record time. A contract for two swept-wing bombers was awarded by the Air Force on March 15, 1951. Eight months later, the first of the two airplanes was ready for engines."

### WATER BASED AIRCRAFT

"The development of radically new hull forms is revolutionising design and creating an unlimited future for water-based aircraft. These new principles make it possible to create a water-based supersonic fighter, a high-speed anti-submarine search plane, and a high speed, efficient cargo aircraft all directly competitive with their land-based counterparts. These new types are now either under construction or flying. All these exciting new designs are major revolutions over their predecessors in appearance and performance, yet we are witnessing only the opening days in this new revolution in a classic airplane type."

This paragraph is quoted from page 69 of *Aero Digest* for June 1952; the article is followed by a bibliography of 34 references; some of them go back nearly twenty years. The age of supersonic water-based aircraft has been largely brought about by Mr. Ernest Stout, of Convair, who for at least fifteen years has wrought with furious energy to dig up the past and to organise the future. He spoke in this country at the Third Anglo-American Aeronautical Conference 1951, on "A Review of High-Speed Hydrodynamic Development," (published by the Royal Aeronautical Society); and his bibliography includes the work of Coombes, Perring, Johnston and Hutchinson on Short Brothers aircraft, in *R. & M.* 1712 and 1718, November, 1935. In U.S.A., other architects of the new age include technicians concerned with the National Advisory Council for Aeronautics testing tanks at Langley Field, and the Stevens Institute of Technology; and also Mr. J. D. Pierson of Glenn Martin, all of them inspired and supported by the U.S. Navy's Bureau of Aeronautics.

Mr. Stout's first step was to design and build a series of radio-controlled flying models, dynamically similar to the project in full scale; some of them were about 20 feet span, and took 4,000 man-hours to build, while smaller models took 1,200 man-hours. Using these, a number of possible prototypes may be tried out without building anything full-scale. Wings and tail could be transferred from one model to another when hull investigations were being made. Then followed experiments on the relationship of length to beam, based on German experiments in 1938. Next, the elimination of the present type of step, with its high aerodynamic drag; the N.A.C.A. experiments with a pointed step began in 1933, and in 1937 extended to a Short Calcutta. Seaworthiness was increased, and a long level floor provided, by multicellular compartments

beneath floor level, dispensing with bulkheads, obstructions, and water-tight doors which might be ajar at the wrong time. Following the practice in the Convair jet-bomber XB-46, hull and wings were joined by a generous fillet, increasing stability so that wing-tip floats became unnecessary; and the effect of this fillet and a spray-dam, retractable like the new type of step, was to deflect the spray downwards, so as to permit reduced height, above the water, of wings, propellers and engines. Following research on the 60° delta wing for the Convair fighter, experiments have been made with a full-sized delta water-based fighter; the prototype has flown, and production orders have been placed.

Convair XF2Y-1 Sea-Dart is a high-speed, fighter-type delta seaplane, powered by twin-jets; the first model had two Westinghouse turbines of about 3,200 pounds thrust, but it is thought that XF2Y-2 may have two Westinghouse J-40 engines of 10,000 lbs. thrust each. This would give Sea-Dart a thrust ratio of 1.18; that is, it would be twice as powerful, for its weight, as Gloster Javelin. It might be supersonic in level flight, but should not be tried out at low altitude. For take-off and landing, upon water runways of unlimited length, the Sea-Dart has hydro-skids, not unlike those used by human beings. Each appears to be about 10 feet long by 12 inches wide, slightly convex on lower surface, and retracted to form the sides of the planing bottom. If they were of aerofoil section, their lifting effect would be 800 times as much in water as in air; even as it is, the skis are said to be skating along the top of the water at only 20 miles per hour. Etymologically, one would expect a hydrofoil to look like a little fat wing, but at the time of writing no such illustration has appeared: Aero Digest of December, 1952, showed a Grumman amphibian, clear of the water, supported by a sturdy hydroski about two feet wide, in the shape of a flat Vee, but its upper surface is uncompromisingly flat, instead of being rounded like the wing of a light aircraft. The single hydroski is the invention of Mr. E. D. Osborne, and the caption says "Grumman amphibian runs on the step of Edo-developed hydroski, designed to accelerate take-off and simplify rough water landing."

Mr. Ernest Stout must have reason to be proud of his ideas and his energy when he looks at Convair XP5Y-1, his anti-submarine water-based aircraft weighing 70 tons, powered by four turboprops. It was developed from a dynamically similar, radio-controlled model of one-tenth scale, which weighed about 125 pounds and was "powered by four midget gasoline engines developing 1½ h.p. It made more than 2,000 test runs." It was illustrated at page 198, and described on page 385, of the 1951 Brassey, with further details on page 329 of the 1952 issue.

A variant of this big seaplane, using the same wings, engines, and most of the hull, is the Convair R3Y-1 "Tradewind" transport, ordered for trans-Pacific flying by the U.S. Navy. Its speed is over 350 miles per hour, cruising at 300. Take-off time, with full load, is thirty seconds. These are the first seaplanes to be fitted with air conditioning and high-altitude pressure equipment, and have rearward facing seats. They can carry seated and litter patients at the same time, as well as troops and cargo. The long, slender hull, developed from Mr. Stout's many models, has a length-over-beam ratio of 10, about double that of previous Convair seaplanes. It uses magnesium for its cargo decks.

Almost more important than these fine aircraft is the development, for



the Navy, of high speed ramp and beaching facilities: floating concrete pontoons, through-docks, high-speed winches, self-propelled beaching cradles, and floating docks to be assembled from air-delivered parts. One is illustrated on page 22 of *Aero Digest* for July 1952. There is a list of electronic equipment weighing about a ton and costing \$125,000: radar, sonobuoys, magnetic airborne detector, and radar countermeasure equipment. The Magnetic Detector "checks the natural lines of force, and registers an indication if the aircraft passes over a unit having its own magnetic field, such as a submarine, at any depth. Lack of movement or water noise do not hamper the indicating device in the least." Radar counter measure equipment is primarily a search device which picks up high frequency transmissions and locates them directionally; and it can pick up a signal much too weak to make the return trip to the mother unit. It can be used offensively to jam enemy signals, and can screen friendly attacking units.

In regard to Government orders, Navy support, and the technical advice of Langley Field and the Stevens Institute, Glenn Martin has had equal facilities with Convair. As far back as 1937, Glenn Martin himself designed, built and flew a tiny scale model of a projected Navy patrol bomber, afterwards styled Martin Mariner. The Martin Star of June, 1952, shows a 15 to 1 length-beam ratio seaplane constructed by applying a new long hull to the wings, engines and hull of one of these old Mariners, making a most graceful aircraft. The hull of this composite aircraft is marked out in squares so that spray patterns of the full-sized aircraft can be checked against those of models similarly marked. It is illustrated in "Jane" 1952-3.

Unofficial reports refer to a U.S. Navy order for a large Martin seaplane which may well be the result of the experiments carried out on this long, chequer-marked hull. Martin XP6M-1 is Model 275 Seamaster—the experimental hull was M.270. The Seamaster will have four large engines, perhaps J.67, the Wright-made Olympus with about 10,000 pounds thrust each. It is reported to weigh 65 tons, and to have a top speed of about 530 miles per hour; and although it has been ordered, it is said, as a minelayer, the U.S. Navy may like also a cargo or passenger version, not very different from the Convair Tradewind. Seamaster will be the first big seaplane to have jets; something similar has been designed by Saunders-Roe, and shown on their stand at Farnborough, and their S.R.A.1. was the first jet-seaplane. In his paper to the British Association on "The Future Development of the Flying Boat Airliner," Mr. Henry Knowler, Chief Designer of Saunders-Roe, dealt fully with the need for the "new look" in water-borne aircraft; and referring to hydrofoils, went on to say "it is possible to foresee a fully retracting flying boat bottom." But some of us, including Mr. Robert Blackburn, have already seen this: Blackburn B.20 had a retractable planing bottom to Patent 433925, designed by Major J. D. Rennie, their Chief Seaplane Designer. A long-ago picture appears on page 61 of "Aircraft Development and Production," published by Paul Elek in 1948.

The few changes in Table V are all American; Grumman not only make the Grumman Albatross Rescue Amphibian, but are trying out the Edo hydro-skis on one of them; and on their old Widgeon, Edo Corporation of College Point, Long Island, has fitted a hull with a length-beam ratio

of 12.5 to 1; it looks an inexpensive way of trying out the new idea. The ubiquitous Albatross is made for sea rescue and supplied to the U.S. Navy, Air Force and Coast Guard. It has skis, as well as wheels, which enable it to land on ice or snow; the sea-rescue door on the port side is split horizontally, so that the lower half can be kept closed; and on the sill there is a small platform from which a member of the crew wearing a safety belt can help persons from the water. There is room for twelve stretchers and two medical attendants; twenty oxygen points have been provided in the cabin; three life-rafts form part of the equipment.

Nord Noroit spans 103 feet, but the weight is not disclosed; it is a twin engined reconnaissance and rescue amphibian, which can stay in the air for 24 hours. The crew of seven includes reserves, and bunks are provided.

Short Brothers and Harland Limited have lately sold a few Sealand amphibians to the Government of India for anti-submarine work.

But although there is only one of it, the finest water-based aircraft in the World is here: the Saunders-Roe Princess was launched, and made its maiden flight in August, 1952, a few days later making a spectacular appearance at the Farnborough Display. The Princess, originally intended for long-range airline operation, is now stated to be a military transport. Its weight is 140 tons; and its payload of 40,000 lbs. would accommodate about 250 passengers if they could be squeezed in, for emergency trooping. Although it was begun, as regards design, as far back as 1943, and has two fixed steps on the underside of the hull, the ratio of length to beam is as much as 9-1, giving this large aircraft a very graceful appearance in flight. The size of the hull permits two decks, in the "double bubble" arrangement. The floats retract outwards and upwards, so as to form extensions of the wing tip. Cruising speed is 380 m.p.h.; the first Princess is fitted with 10 Bristol Proteus turboprops, of the 600 series; a second boat is finished, but is awaiting production of more powerful Proteus 700 engines. The 10 engines are housed in nacelles in four pairs, and two singles.

Now that the new look is with us, not only in U.S.A. but in the long slender lines of projects at Saunders-Roe or Short & Harland, we shall no longer call water-based aircraft "flying-boats." The term infers a quantity of inbuilt drag, so that the boat-with-wings has been said to be about as aerodynamic as a barge or a brick; but the modern plan-form is something like a delta-winged dragonfly, and through its endurance may be short, Mr. Ernest Stout's Sea-Dart may yet break the speed and height records made by landplanes. We will hope, too, that Mr. Henry Knowler's Princess, a 140-ton water-based aircraft with a pay load of 40,000 lbs. will yet prove its quality upon the airways of the world.

### AIR LINERS OF TO-MORROW

Though all the world knew of the existence of de Havilland Comet, the inauguration of the first scheduled service of air liners with jets touched the imagination of operators and potential passengers; and for the first time since about 1930, U.S.A. thought fit to order air liners from the United Kingdom. In August 1952, the Bristol Britannia flew for the first time; and though the Vickers Viscount had been available for nearly four years, the production version of type 701, together with later types, drew orders from British European Airways, France, Irish Airlines, and

Trans-Australian Airlines amongst others. Exhibition of these ultra-modern air-liners at the Farnborough Display excited great interest amongst potential buyers, and the possibility of a great increase in our export trade in aircraft was another feature of a most eventful aviation year.

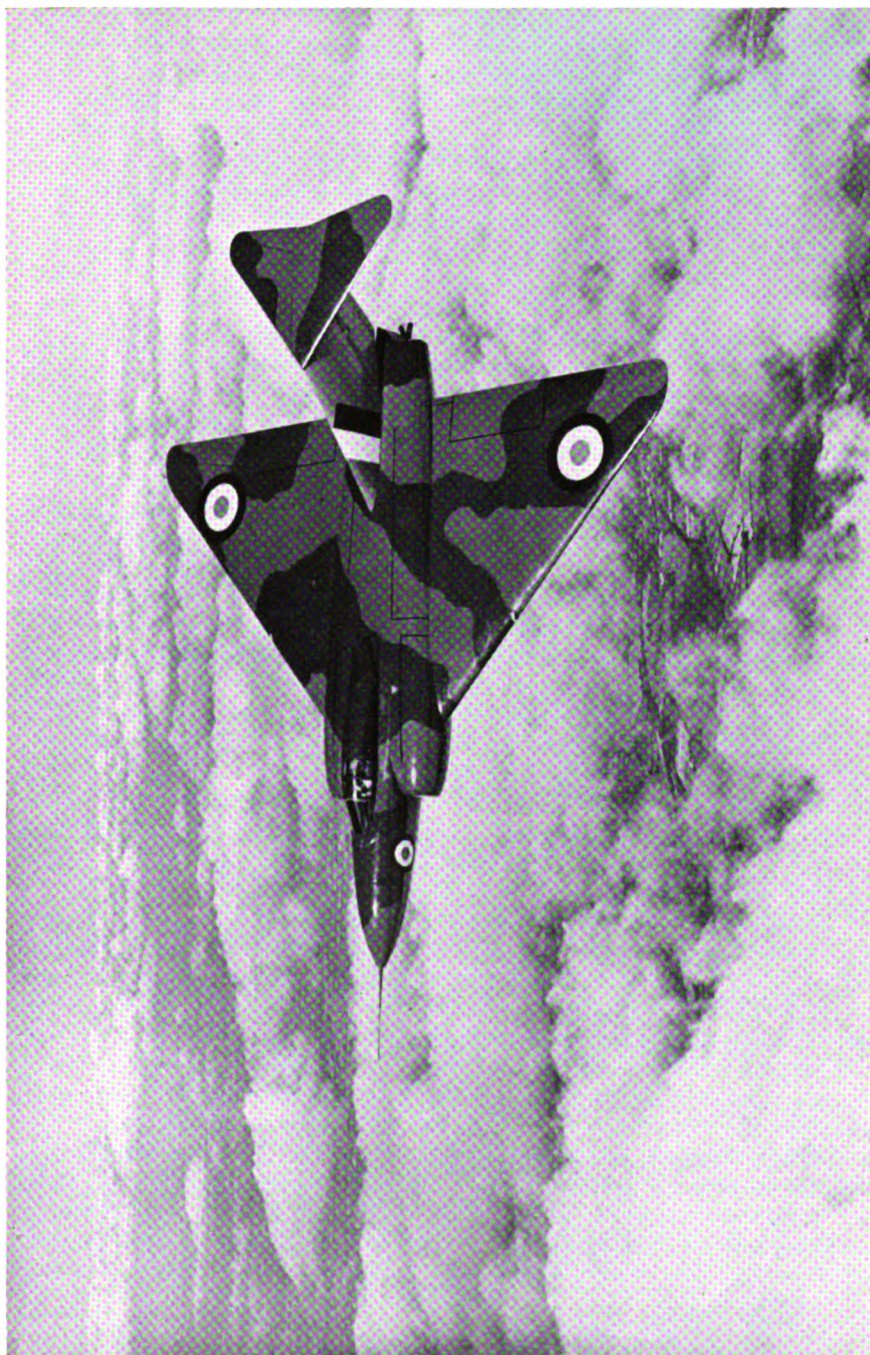
The Series I Comet cruises at a little under 500 m.p.h., with stage lengths of about 1,500 miles; it has Ghost engines. The Series II Comet is suitable for stage lengths of 2,000–2,500 miles, and is equipped with Rolls Royce Avon engines of about 9,000 lbs. thrust.

Pan-American Airlines required an even longer stage length, and in the *de Havilland Gazette* of December, 1952, preliminary details were supplied of a 58 to 78-seat main-liner for world service in 1957; a firm order for three of these has been placed by Panam. The fuselage is 18 ft. longer than that of Series I Comet; baggage space and toilet facilities will be increased to deal with 58 passengers in the First Class version, or a maximum of 78 in "the high density tourist class version;" American operators style this type of travel as "coach comfort." The four Rolls Royce Avon engines will have a greatly increased thrust, (about 9,000 lbs.) and improved specific consumption; the range of the aircraft is extended by the addition of two leading edge tanks which bring the total fuel capacity up to over 8,000 Imperial gallons. With a pay-load of full capacity, and adequate fuel reserves for climb, descent, stand-off and diversion, all against a 50 m.p.h. head wind, the practicable stage length will be 2,700 statute miles. It will be suitable on the most critical westerly flight from London to New York with one intermediate stop. Cruising speed will be about 500 m.p.h. and cruising altitude slightly higher than that of either Series I or Series II.

About 25 Bristol Type 175 Britannia airliners are being built for B.O.A.C. operation on African and Australian routes in 1955. The method of seat attachments makes possible a large variety of seating arrangements: fifty passengers can be accommodated for long-distance travel, or over 100 for shorter stages. Large cargo holds are provided. Typical loading diagrams show 50 passengers four abreast with a wide gangway; 61 passengers five abreast; 83 passengers six abreast. The aircraft has a total weight of 140,000 lbs., and a pay load of 25,000 lbs. over a distance of 4,000 miles in still air, at a cruising speed of 360 m.p.h. and altitude of 30,000 ft.

Vickers Viscount of the 700 Series is made in at least three versions; that styled Type 701, with four Rolls Royce Dart engines, has a freight hold with external loading doors. The main passenger cabin has forty seats, in pairs on each side of the central gangway. The hull is pressurised, and the air conditioning system can be operated on the ground when the engines are stopped. The all-up weight is 52,500 lbs; and the normal operational cruising speed at 25,000 feet is 311 m.p.h.

The stimulus of the *de Havilland Comet* has resulted in interesting projects on both sides of the Atlantic: Sir Roy Dobson of Avro has proposed a passenger version of the Avro Vulcan; work has begun on a 150 seater derived from the Vickers Valiant, both as a military transport and an air-liner, with four of the new Rolls Conway engines; and an issue of the *Handley Page Bulletin* describes HP-97, two decks in "double bubble" form, seating 150 passengers.



Gloster G.A.5. Javelin



In U.S.A., Boeing are embarking on the design of a civil jet transport, model 707, with a capacity of 60–80 passengers; Douglas and Lockheed both announce projects for jet liners of about 150,000 lbs. an all-up weight which hardly seems enough for any number of passengers exceeding 60, over long stages; or perhaps these passengers will be granted only “coach comfort.”

As usual, the American Press can tell us more of our own ventures than we know ourselves; and they prophesy that all these U.S.A. products will be outclassed by Comet IV: gross weight of 200,000 lbs. with four de Havilland axial-flow jet engines, each developing 15,000 lbs. of static thrust, with a greatly improved specific fuel consumption as compared with any other existing jet engine.

In this, as in other fields, it sounds an interesting and even exciting future; developments on these lines could not fail to be of permanent benefit to the free countries, to our own export trade, and to commercial aviation both in Europe and the West.

Transport of equipment in war is rapidly becoming of equivalent importance to that of personnel; and cargo carriers, until lately of land-based types only, now include one or two helicopters, and at least three water-based aircraft—Convair Tradewind, Glenn Martin Seamaster, and Saunders-Roe Princess.

Piasecki PV-15 Transporter has not flown at the time of writing, and is not in Table VI. It is a large twin-rotor helicopter, with the U.S.A.F. number XH-16, designed to meet requirements for a long-range rescue helicopter, or troop and cargo transport. It can be fitted with a very high landing gear to take a pack or pod adapted for loading and unloading close to the front line, where the terrain may preclude the construction of landing strips. Some years ago the far-sighted Editor of *Aero Digest* prophesied that helicopters would be produced to lift the detachable pods of Fairchild Packplane or Lockheed Constellation with Speed-Pak; and will now see his vision become actuality.

With the high landing gear and without the pod, Piasecki XH-16 can be used as a flying crane; and in this application would correspond to the giant Hughes helicopter XH-17 previously mentioned, both suited to the rapid construction of bridges.

Tankers for refuelling are already in use in U.S.A., chiefly conversions of Boeing B.29; the same firm have in hand Boeing B.707, a jet-tanker capable of more than 500 miles per hour. It is said that Vickers Valiant, or rather Vickers 1000, may also be made in a tanker version.

Improved versions of Convair XC-99, Douglas C-124, and Boeing C-97 are in hand, with greatly increased gross weight; and our own Blackburn and General “Beverley” is also putting on weight, apart from being fitted with a pair of Napier Nomad compound engines. This experimental aircraft should be capable of greatly extended range, in addition to the other virtues mentioned in a previous number of *Brassey*.

G. W. WILLIAMSON

TABLE I  
SOME TWIN-JET FIGHTERS

Maker and Type	Span ft. in.	Gross weight, lb.	Static thrust, lb.	H.P. at 600 m.p.h.	Thrust Weight Ratio
de Havilland D.H.110 ..	51	30,000	13,000	21,000	0.43
Gloster Meteor N.F.11 ..	27	19,000	14,400	23,000	0.76
„ Javelin .. ..	52	30,000	16,600	26,500	0.55
Supermarine 508 .. ..	41	—	14,400	23,000	—
Avro (Canada) Canuck ..	52	34,000	14,000	22,400	0.41
Chance-Vought Cutlass ..	38	21,200	12,000	19,200	0.52
Douglas Skyknight ..	50	27,000	9,600	15,300	0.35
McDonnell Voodoo ..	39 8	24,000	6,400	10,300	0.43
Northrop Scorpion ..	56	30,000	10,000	16,000	0.33

TABLE II  
SOME SINGLE-JET FIGHTERS

de Havilland Venom ..	41 9	12,000	5,000	8,000	0.41
Hawker Hunter F.2 ..	33 8	—	8,300	13,300	—
Supermarine Swift ..	31 9	—	6,500	10,400	—
Douglas Skyray .. ..	24	17,000	9,500	16,500	0.56
Grumman Cougar ..	38	18,500	5,000	8,000	0.27
Grumman Jaguar ..	38	29,000	7,500	12,000	0.26
Lockheed Starfire ..	38 10	15,330	6,500	10,000	0.41
McDonnell Demon ..	40	22,000	9,500	15,200	0.43
North American Sabre 45	40	20,000	10,000	16,000	0.50
Republic Thunderstreak	33	22,000	8,300	13,300	0.38
Dassault Mystère .. ..	33 6	17,000	6,250	10,400	0.38
MiG.15 .. ..	52	11,000	5,500	8,800	0.50
Saab Lance .. ..	37	17,000	6,250	10,400	0.38



TABLE III  
BOMBERS, ALL-JET OR JET-ASSISTED, IN ORDER OF SIZE

Maker and Type	Span, ft.	Weight, tons	E.H.P.*	Remarks
Convair YB-60 .. ..	206	180	117,000	8-jet
„ B.36 .. ..	230	163	53,000	Maximum range, 10,000 miles. Maximum load 42 tons.
Boeing XB.52 .. ..	185	177	117,000	8-jet
Northrop YB.49 .. ..	172	105	64,000	The "All-Wing" air- craft. Speed 600+
Boeing XB.47C .. ..	116	82	55,000	
Short Bros. S.A.4 .. ..	109	—	38,000	
Handley-Page Victor .. ..	120	67	48,500	
Avro Vulcan .. ..	103	60	64,000	
Vickers Valiant .. ..	114	54	38,000	
Consolidated Vultee XB.46 .. ..	113	45	32,000	Speed 500+
North American R.B45C	90	50	32,000	Speed 550+. Range 1,200 m.
English Electric Canberra	64	20	21,000	Speed 555. Range 1,500 m.
Sud-Ouest 4000 .. ..	58	20	14,700	
Martin XB.51 .. ..	55	7	15,000	Maximum speed, 600 m.p.h.

\* E.H.P. is the Equivalent Horse-power at 550 m.p.h.

TABLE IV  
MILITARY TRANSPORTS

Maker and Type	Span, ft.	Weight, tons	H.P.	Maximum Load and Maximum * Range
Consolidated Vultee Con- vair XC.99 .. ..	230	132	21,000	50 tons; 8,000 m.
Douglas C.124.B .. ..	173	87	22,000	25 tons; 6,280 m.
Boeing C.97.A .. ..	141	73	14,000	34 tons; 3,750 m.
Blackburn and General Universal Transport ..	162	57	7,000	19 tons; 1,750 m.
Lockheed Constellation	123	53	10,00	22 tons; 5,500 m.
Handley Page Hastings	113	36	6,700	9 tons; 3,886 m.
Fairchild XC.120 .. ..	109	36	6,500	9 tons; 1,150 m.
Chase XC.123A.. ..	110	35	4,800	14 tons; 5,060 m.
Bristol Freighter .. ..	108	19	4,000	5 tons; 1,680 m.
Nord Nor-Atlas .. ..	106	16	4,000	5 tons; 1,000 m.
Vickers Valetta .. ..	89	16	4,000	5 tons; 1,410 m.

\* Maximum range is stated for a military load much less than the maximum



TABLE V  
FLYING BOATS

Maker	Mk. or Number	Weight (tons)	Speed (max.)	Range	Total H.P.
Saunders-Roe	Princess	140	380	5,500	35,000
Saunders-Roe	S.R. A.1, jet fighter, single-seater	6.5	—	—	11,000
Short .. ..	Sunderland	27	213	2,690	4,800
Short .. ..	Solent	35	276	2,200	8,160
Short .. ..	Sealand (t/e amphib.)	4	189	425	850
Convair ..	XP.5.Y.1, long range, patrol	71	380	10,000	22,000
Convair ..	Sea-Dart	7	580	—	9,300
Grumman ..	Albatross amphibian	12	270	1,400	2,850
Grumman ..	Mallard	56	215	1,380	1,200
Martin ..	Marlin P.5.M.1	—	—	—	6,000
Martin ..	Mars	65	222	—	12,000
Nord .. ..	Noroit	—	230	2,610	2,400

TABLE VI  
HELICOPTERS

Maker	Name	Seats	H.P.	Total Wt.
Bristol.. ..	Type 173	15	1,100	10,600
Bristol.. ..	Type 171, M.3	4/5	550	5,200
Cierva (Saunders-Roe) ..	W.11, Air Horse	24	1,620	17,500
Fairey .. ..	Gyrodyne	4/5	525	4,800
Westland .. ..	S.51, Dragonfly	4	500	5,700
Breguet .. ..	Gryoplane	4	450	2,100
Bell .. ..	Model 48	5/8	550	6,286
Gyrodyne .. ..	GCA, Model 2	5	450	5,400
Piasecki .. ..	HRP, Recuer	2/8	600	6,900
Piasecki .. ..	HUP, Retriever	2/6	600	7,129
Sikorsky .. ..	S.55	12	600	6,800
Sikorsky .. ..	S.52	3/4	245	2,400

TABLE VII  
SOME LARGE PROPELLER TURBINES

Maker and Type	Shaft horse- power	Thrust, lb.	E.H.P.*	Weight, lb.	Pounds per E.H.P.
<b>ARMSTRONG</b>					
Mamba, Mk. 504 ..	1,320	405	1,725	800	0.45
Double Mamba ..	2,640	810	3,450	2,150	0.62
Python .. ..	3,670	1,150	4,820	3,450	0.71
<b>BRISTOL</b>					
Theseus .. ..	2,220	825	3,045	2,205	0.73
Proteus 3 .. ..	3,320	1,200	4,520	2,650	0.60
Coupled Proteus 2 ..	6,400	1,600	8,000	8,106	1.00
<b>NAPIER</b>					
Eland .. ..	3,000	241	3,000	1,575	0.50
Double Naiad .. ..	2,970	482	3,452	2,200	0.65
<b>ROLLS</b>					
Clyde .. ..	3,500	1,200	4,700	2,500	0.55
Dart .. ..	1,400	310	1,710	850	0.50
<b>ALLISON</b>					
T38 .. ..	—	—	2,750	1,225	0.45
T40 .. ..	—	—	5,525	2,575	0.47
<b>CURTISS WRIGHT</b>					
Typhoon .. ..	—	—	10,000	—	—
<b>PRATT AND WHITNEY</b>					
T34-P-2 .. ..	6,000	600	6,600	2,550	0.40
T48 .. ..	—	—	10,000	—	—

\* E.H.P. is Total Equivalent Horse-power at 375 m.p.h.

TABLE VIII  
LARGE ALL-JET TURBINES

Name and Type	Thrust, lb.	E.H.P.*	Weight, lb.	Pounds per E.H.P.
<b>ARMSTRONG</b>				
Sapphire .. ..	7,200	12,500	2,500	0.20
<b>BRISTOL</b>				
Olympus .. ..	9,750	17,000	3,520	0.21
<b>ROLLS-ROYCE</b>				
Avon .. ..	6,500	11,300	2,400	0.21
Tay .. ..	6,500	11,300	2,000	0.18
Nene .. ..	5,000	8,700	1,550	0.18
Conway .. ..	10,000	17,300	—	—
<b>DE HAVILLAND</b>				
Ghost .. ..	5,000	8,700	2,011	0.23
<b>AVRO (CANADA)</b>				
Orenda .. ..	6,500	11,300	2,650	0.23
<b>ALLISON (U.S.A.)</b>				
J.33 .. ..	4,600	8,000	1,795	0.23
J.35 .. ..	5,000	8,700	2,260	0.28
J.71-A-1 .. ..	9,800	17,000	3,650	0.22
<b>GENERAL ELECTRIC (U.S.A.)</b>				
J.47 .. ..	5,200	8,700	2,500	0.29
J.73 .. ..	9,200	16,000	3,600	0.22
<b>PRATT AND WHITNEY (U.S.A.)</b>				
Turbo-Wasp, J.42 (Nene)	5,000	8,700	1,723	0.20
J.48 (Tay) .. ..	6,500	11,300	2,000	0.17
J.57 .. ..	10,000	17,300	—	—
<b>WESTINGHOUSE (U.S.A.)</b>				
J.40-WE-2 .. ..	7,500	13,000	3,000	0.23
<b>WRIGHT (U.S.A.)</b>				
YJ-65 (Sapphire) ..	7,220	12,500	2,500	0.20
J.67 (Olympus) ..	9,750	17,000	3,520	0.21
<b>TURBOMECA</b>				
Snecma Atar .. ..	6,160	10,600	2,068	0.21

\* E.H.P. is Equivalent Horse-power at 650 m.p.h.

## CHAPTER XXXI

### THE MEDICAL ASPECTS OF HIGH-SPEED FLYING

By T. G. DOBIE

SINCE 1912, when the Services first took up aviation, the aeroplane as a tactical weapon has been developed rapidly and the quest for more and more speed and greater operational altitude is carried on daily. In 1912, two service medical officers were appointed to the Royal Flying Corps, Staff Surgeon H. V. Wells, R.N., to the Naval Wing and Captain E. G. R. Lithgow, R.A.M.C., to the Military Wing and so began the medical investigations into the problems of Military flying.

With the introduction of aircraft powered by jet engines into the Royal Air Force, a new era of high-speed flying has arrived. Aircraft have already flown faster than the speed of sound and squadrons of supersonic aircraft will soon be in general service.

At very high speed, straight and level flight itself creates very few physiological problems and indeed it is only when his aircraft is close to another object that the pilot has any pronounced sensation of speed. That is to say, the human body is unaffected by high speed provided that it is protected from changes in its external environment. In this field, the medical research worker and the engineer work closely together in the early stages of aircraft design in order to provide optimum conditions for the aircrew whenever possible. Where this cannot be achieved entirely in the construction of the aircraft, the physiologist is called upon to design personal safety equipment to fulfil this purpose.

The medical problems of high-speed flying are more or less independent of the type of aircraft except where such problems involve certain specific pieces of equipment such as ejection seats, which will be discussed later, since these are not present in all aircraft. The altitude at which the aircraft is called upon to operate is, however, an obvious variable, high and low altitude flying having many specific difficulties.

In order to classify the various topics these will be considered under two main headings, namely the physiological and psychological problems.

THE PRINCIPAL PHYSIOLOGICAL PROBLEMS will be considered first under the following sections :

- (1) Anoxia
- (2) Problems associated with low atmospheric pressure
- (3) Accelerations
- (4) Kinetic Heating
- (5) Reaction time
- (6) Flying clothing and equipment
- (7) Vision and Hearing
- (8) Emergency escape from aircraft.

#### 1. ANOXIA

In recent years, aircraft have operated at higher and higher altitudes due to the fact that the jet engine operates most efficiently at height.

This is a most significant point, to the extent of doubling or even trebling the mileage which can be covered by an aircraft on a given amount of fuel. There may also be various tactical advantages, such as overflying enemy defences and weather. The majority of turbulent cloud formations, such as cumulo-nimbus, rarely exceed 40,000 feet.

When air is breathed in, it is carried down to the terminal air sacs of the lung and comes into close proximity with the blood stream, only being separated from it by the thin lining of the lung. A gaseous exchange then occurs where oxygen is taken up by the blood and the waste carbon dioxide from the blood passes out into the air space. Due to these changes we have then in lung spaces at sea-level pressure a gas mixture of the following partial pressures :

O <sub>2</sub>	.	.	.	.	.	105 mm. Hg.
Inert gases	.	.	.	.	.	565 mm. Hg
CO <sub>2</sub>	.	.	.	.	.	45 mm. Hg
Water	.	.	.	.	.	45 mm. Hg
						<hr/>
Total	.	.	.	.	.	760 mm. Hg

The partial pressure of oxygen in the gas mixture in the lung spaces is of primary significance since it determines the amount of oxygen which will pass through the lung wall to maintain the oxygen level of the blood. If this falls below a critical level, the individual shows signs of anoxia. Since brain tissue is most sensitive to any chemical alteration in the blood stream, the symptoms of anoxia are chiefly those caused by its effects on the brain :

- (1) Impairment of judgment
- (2) Dulling of thought
- (3) Disorientation
- (4) Dizziness
- (5) Failing of hearing, vision, and smell
- (6) Unconsciousness.

The major problem which is met today is not that of anoxia due to breathing air at levels above 10,000 feet. It is that of suffering from anoxia at high altitude whilst breathing pure oxygen, due to the reduction of atmospheric pressure and a consequent proportionate reduction of partial pressure of the components of the gas mixture. From the figures of partial pressure already quoted—it can be seen that, breathing pure oxygen, a pilot should only need a total partial pressure of gas mixture of 195 mm. Hg (105+45+45) to maintain a satisfactory level of oxygen in the blood. This pressure is equivalent to a height of 33,000 feet. The actual level of oxygen in the blood necessary for efficiency varies however with the work being done. A pilot seated in an aircraft can remain efficient with a partial pressure of oxygen of less than 105 mm. Hg in equilibrium with the blood. If at rest he can, in fact, carry out his tasks up to about 40,000 feet on full oxygen. Beyond this, he becomes increasingly inefficient, and at 45,000 feet the least exertion would be sufficient to induce unconsciousness.

To overcome this, operational aircraft are fitted with pressure cabins, the pressure differential being maintained by the engines. No attempt

is made to maintain sea-level pressure in the cabin, the weight of equipment to achieve this would be prohibitive and should the cabin be holed, the ensuing pressure drop would be serious. This problem of "explosive decompression" will be dealt with separately.

The aircrew, although in a pressure cabin, are still using oxygen which allows "cabin pressures" in the region of 25,000 feet and also means that should explosive decompression occur the pilot is protected.

It has already been shown that the pilot's useful ceiling on full oxygen unpressurised is in the region of 40,000 feet, and so if the pressure cabin is put out of action, unconsciousness will ensue unless the pilot can get down to this height. This, quite clearly, is not only a medical hazard, but a serious operational limitation from two distinct aspects which have already been mentioned. Firstly any height superiority over enemy forces is immediately lost and secondly the reduction in height will mean a reduction in aircraft range. This in certain circumstances may be even more significant. This would in fact in a particular case be the deciding factor in whether or not an aircraft is capable of reaching the home base.

In order to maintain efficiency at very high altitudes, however, the airman must be equipped with a pressure suit. This is, in effect, a tailored-pressure cabin producing a tolerable pressure around the individual should the cabin be damaged.

## 2. PROBLEMS ASSOCIATED WITH LOW ATMOSPHERIC PRESSURE

### (i) *Decompression Sickness*

This condition is entirely due to reduced pressure. This low pressure causes bubbles of nitrogen to come out of solution in the blood stream and tissues of the body. The symptoms are very variable from individual to individual and are not constant even in the same subject. They can vary from a minor degree of itching of the skin, to pains in the limbs and joints and, in the worst cases, to a complete collapse. The greater the amount of physical work carried out by the airman and the longer he is exposed to the reduced pressure then the greater is his susceptibility to symptoms of decompression sickness, or "bends" as it is loosely called.

Individuals who are shown to be particularly susceptible to this condition on trial runs in the decompression chamber would not be suitable for very high altitude operations of long duration. The incidence of "bends" can be reduced by prolonged breathing of oxygen before take-off, thereby replacing most of the nitrogen in the blood. This procedure takes time, however, and could be a limiting factor in the degree of flexibility and speed of turn round of an operational force.

### (ii) *Explosive decompression*

This occurs when cabin pressure is lost and the tactical complications have already been mentioned. The effects on the human body, however, depend on the actual rate of pressure change in so far as the risk is associated with rapid pressure differences in parts of the body. If the pressure loss is slow then the equilibration of these pressure differences within the body can take place. Should the pressure change be great however and take place instantaneously there is the possibility of damage to the lung

and also of abdominal pain should there be much gas in the bowel. Apart from the actual rate of pressure change there are four significant associated factors :

- (i) The total pressure change in lb./sq. in. and the volume of the pressure cabin.
- (ii) The ratio of original to final pressure.
- (iii) The amount of air in the lung at the time.
- (iv) Whether or not the entrance to the wind-pipe is open.

In the case of (i) and (ii) it can be seen that it is better to be pressurised to 25,000 ft. "cockpit altitude" should there be any likelihood of damage to the pressure cabin rather than to some very much lower level.

An associated problem in the event of damage to the pressure cabin which could be a factor in deciding whether or not a sortie could be continued might be the very low temperatures experienced at altitude. This, however, will be discussed under flying clothing.

### 3. ACCELERATIONS

Although there are various types of acceleration—linear, centrifugal, and angular—all of which may at some time or another affect the aviator, by far the commonest to be experienced is centrifugal acceleration during radial movements of the aircraft. As a unit of measurement of acceleration it is related to the force exerted by the earth's gravitational field—as denoted by the letter "g". Hence 5 "g" would indicate an acceleration equivalent to five times gravity. "g" can have a positive or negative value, positive "g" affecting the body from head to foot and tending to cause "black-out" whereas negative "g" works in the opposite direction tending to cause "red-out". The former condition—namely "black-out"—is the more common—being experienced when the pilot's head is on the inside of the radius—as in tight turns or when pulling out of a dive.

This problem may be met at relatively low speeds; indeed "black-out" was first experienced by aviators whilst training for the Schneider Trophy races in 1929. This denoted the advent of stronger and more efficient aircraft capable of doing tight turns at high speeds. The problem is however more common and more important with the modern high-speed aircraft since the amount of acceleration experienced for a given mass of aircraft in a given radius of turn increases by the square of the speed. This means that as the speed increases the "g" experienced in a turn increases. Both man and machine have a limiting "g" and as either is reached the radius of the turn must be increased.

Let us consider the effects of positive "g" experienced by a pilot when pulling out of a steep dive such as during a dive bombing or rocket attack on a ground target, assuming he exceeds his black-out threshold. The symptoms begin not at the point of pulling out from the dive. There is a short delay and so when the pilot is completely "black-out" he is on the ensuing climb. The sensations are in the following order :

- (i) A general sensation of increased weight of the body, head, and limbs.
- (ii) An impairment of vision which occurs in three phases; firstly a general greying of the picture followed by a severe veiling of all the central visual field and lastly a sensation of total blackness.

- (iii) Unconsciousness becomes complete as the airman changes posture, that to say his head lolls and his hand may fall off the control column. The airman recovers quickly and there are no after effects apart from a feeling of tiredness particularly in the legs. After a number of consecutive black-outs his powers of concentration are temporarily reduced.

From a survey of a large number of subjects, it has been found that the average aviator "blacks out" when he has experienced 5 "g" over a period of five seconds. This level may vary, however,  $\pm 1$  "g" in any one person in any one day. The sensation of greying of vision usually occurs at 1 "g" below the black-out threshold.

These symptoms which occur under positive "g" are entirely due to disturbances in the circulatory system in the body. As the weight of the column of blood from the heart to the brain increases and pooling of blood tends to take place in the large veins of the abdomen and legs, so there is insufficient pressure of blood in the head to maintain normal visual and brain function.

At low altitudes it is quite possible to pull 8-10 "g" on many fighter aircraft without encountering structural failure and so the pilot blacking out at 5 "g" over a period of 5 seconds is the limiting factor in deciding how tight a turn might be. For this reason it is of obvious advantage, both in attack and defence, to be able to raise his "black-out" threshold. It is therefore important to note the various factors which can affect this threshold one way or another. In passing it should be pointed out that at 45,000 ft. a fighter of average wing loading (say 45 lb./sq. ft.) will stall at about 3 "g" owing to the "thinness" of the air at that height.

An individual's "black-out" threshold will be lowered if he is in poor physical condition, that is to say, due to the after effects of illness or over indulgence in alcohol or tobacco. It will also be lowered if he is suffering from fatigue or anoxia, or carbon monoxide poisoning; the blood is already low in oxygen and so the brain will be affected when less blood has been pulled from the head than would normally happen.

There are various factors which will increase the airman's tolerance to "g". In the first place his general state of health is of course significant. Apart from this, however, there are various ways in which the circulatory system of his body can be "supported" in order to diminish the fall in blood pressure at the head which we have shown already is the cause of his symptoms. It follows that this could be done in two ways, either by altering the position of the pilot so that the blood column from brain to heart does not lie parallel to the radius of the turn or by preventing pooling of blood by the application of pressure. In order to alter the position of the pilot from the present seated position there are many complications in the cockpit layout, and for this reason the reclining or crouching position is not in common use. The greatest protection from black-out would be achieved in either the fully prone or fully supine position. This would, of course, entail the design of special aircraft and so is not applicable to the problem of raising the airman's black-out threshold in conventional aircraft.

The most common means of raising black-out threshold is therefore by "supporting" the circulatory system either by some voluntary movement

on the part of the pilot or alternatively by applying external pressure to the dependent part of the body by means of an "anti-'G' suit".

The voluntary manœuvres which can be carried out are mainly concerned with effecting a relative increase in the pressure in the abdomen compared with that in the chest. This relative increase of pressure will thus reduce the amount of blood pooling taking place below heart level and so help to maintain the pressure of blood in the head. The most common voluntary manœuvre frequently used by fighter pilots was that of yelling loudly. This had the effect of raising the abdominal pressure. This was augmented in Spitfire aircraft by the provision of a two-position rudder bar whereby the pilot placed his feet on the top range before pulling on "g", thereby raising his legs and increasing abdominal tension to some extent.

The wearing of an anti-"g" suit offers the pilot two advantages. Not only does it raise his black-out threshold, but it also reduced the amount of fatigue which would otherwise be experienced by flying at or near the normal black-out threshold. The anti-"g" suit is light and comfortable to wear and can be looked upon as an essential piece of the modern fighter pilot's personal equipment.

Negative "g", acting from foot to head, by virtue of the fact that the blood is being forced towards the head, leads to a condition known as "red-out", if the limitation of the human body is exceeded. The human body is unable to adapt itself to negative "g" and considerable, prolonged discomfort and even tissue damage may result from small values. 3 Negative "g" sustained for 4 or 5 seconds produces facial congestion and marked mental confusion which may last for hours or even days. The facial congestion usually leads to bleeding into the covering of the eyeball, the nasal sinuses, and behind the ear drum at about 4 "g".

An airman may be subjected to lateral "g" during combat or during crash landings. The body is, however, little affected by this and even values up to 10 "g" produce little or no stress.

Angular accelerations effect the small semi-circular canals of the inner ear producing a sensation of motion. This will be mentioned later along with other visual considerations.

#### 4. KINETIC HEATING

The kinetic heat produced by the friction of an aircraft moving through the air is the only effect directly attributable to high speed on a straight and level course. It is, however, a most important effect and at speeds in the region of 2,000 miles an hour will be the major consideration in the choice of material for aircraft construction. At the present-day speeds of 600 m.p.h. there may be a rise in cockpit temperature of about 30° C. due to the speed alone. This temperature rise is proportional to the increase in true air speed of the aircraft, becoming something in the order of 165° C. at 1,500 m.p.h. It is thus apparent that we have reached a stage where some means of refrigeration must be looked upon as a fundamental part of the aircraft. This piece of equipment may well prove to be a serious weight penalty. Figures as high as 10% have been quoted as the percentage of the total weight of the aircraft for a refrigeration unit in aircraft capable of 2,000 m.p.h. Special suits have been devised



for the pilot's comfort in present-day aircraft and will be included in the resumé of flying clothing.

## 5. REACTION TIME

Under experimental conditions in a laboratory, the reaction time of an individual may be of the order of  $\frac{1}{3}$  of second, but in the cockpit this time is very much longer for various reasons. It will depend, for example, on the situation and the type of signal or warning which initiates a particular reaction. There may be delay in interpreting the situation before, in fact, a physical response is forthcoming, and, of course, the true reaction time must be measured from the onset of emergency or warning until the correct action has been taken. Instead of being in the order of  $\frac{1}{3}$  second, the pilot's reaction time may be many seconds.

It will be seen that this situation can be improved by giving careful consideration to the layout of the cockpit and the ease with which instruments can be interpreted. In the same way any discomfort or fatigue will affect reaction time, whether this be due to insufficient sleep before take-off or due to low cockpit temperatures or some degree of anoxia.

Even at present-day speeds, any inaccuracy in the control of the aircraft or its armament may lead to considerable errors of position. During ground attack, for example, an error of  $\frac{1}{3}$  second at a speed of 500 m.p.h. will give a ground position error of approximately 150 feet. At 1,000 m.p.h. on the other hand, an aircraft travels 1 mile in just over  $3\frac{1}{2}$  seconds, which may, in fact, be the time it takes for a pilot to react to a situation. The pilot is therefore working to the limits of capabilities, and aids for navigation and bombing and for the control of the aircraft are demanded and these must be such that the presentation of information is both accurate and readily available.

It should be borne in mind, however, that although many situations at high speed appear to be beyond the capabilities of the pilot, the step to fully automatic pilotless aircraft need not necessarily be an improvement. Despite certain limitations the flexibility and powers of analysis of the human mind plus the dependability of the body under a wide variety of extreme and often unforeseen situations makes it a difficult "mechanism" to replace.

## 6. FLYING CLOTHING

There are two ranges of flying clothing, cold-weather flying clothing and that which is designed for hot conditions. It must be realised, however, that such clothing cannot be considered purely from the geographical location of the aircraft's home base. Aircraft are now capable of operation at great ranges and altitudes, altitudes where the outside air temperature may be as low as  $-80^{\circ}$  C. It follows that a pilot may be at readiness in his aircraft in a sweltering tropical heat, yet on that trip may be over-flying cold barren terrain or else fighting in very much sub-zero air at high altitudes. In the first case he must be prepared to survive on the ground if shot down and in the latter must be protected in case of damage to his pressure cabin, and lowered cockpit temperatures.

For flying in hot conditions the flying suit is, of course, specially light

in weight and the flying helmet is also of some equally comfortable material.

The cold weather clothing is designed on the layer principle—a number of layers with air trapped between them, being the most effective means of insulation. If this latter type of clothing is worn for protection, yet cooling is needed for sitting in the cockpit before take-off or to combat kinetic heating, this can be achieved by ducting cool air through the suit. This allows evaporation of sweat from the skin. In an emergency case, where the pilot is subjected to a blast of very cold air—say  $-50^{\circ}\text{C}$ . at altitude, electrically heated clothing can be used as a means of protection. This may be the only way of ensuring that the pilot is indeed able to remain at his intended altitude.

It is sufficient to say that whatever outer garments and underclothing the airman is wearing, they must be designed for comfort and avoid any restriction of movement. His socks and boots must be warm yet they must be such that he is capable of walking long distances in them in comfort should he be unfortunate enough to have to “walk home” from a sortie.

The personal safety equipment which is worn by the modern operational pilot has become relatively complex to cater for all contingencies. Instead of a conventional oxygen mask, we see that he may have to wear a pressure suit, perhaps an “anti-‘g’ suit” as well. He will almost certainly be wearing a life-saving waistcoat or “mae-west” as it usually referred to, for survival on water, quite apart from his parachute dinghy assembly which is located in the aircraft seat. In certain cases, there may also be the addition of a protective helmet to prevent damage to the skull during crash landings or from contact with the top or sides of the cockpit in particularly bumpy conditions.

## 7. VISION AND HEARING

At the very high speeds which are envisaged shortly, the lag in the visual mechanism from stimulus to appreciation is very significant. At a speed of 1,800 m.p.h., an aircraft would have moved about  $\frac{3}{4}$  of a mile in that time which elapses between the arrival of an object in the pilot’s visual field and his being able to recognise it. Bearing in mind that reaction time must be added to this, two aircraft arriving out of cloud 3,000 ft. apart heading towards each other would collide before either pilot could take avoiding action.

It has already been mentioned that an illusion of motion can be experienced when subjected to angular accelerations. This is called an occulo-gyrol illusion, and is due to a change in the rate of rotation of the aircraft rather than the actual rotation. This effect is particularly noticed under low illumination, and is brought about by fixing one’s gaze on a dimly lit object which is rotating with the aircraft in the dark. The object moves in the direction of the turn until the rate of rotation is constant when it will slow and stop; it will then appear to go in the other direction and then stop.

During high-speed escape from aircraft it is advisable that the eyes and face are protected by some means or another—probably in the form of a visor. This is particularly important at speeds much above 500 m.p.h.

A tinted visor is also most useful to the pilot to protect his eyes against glare at high altitudes. It has the advantage over spectacles and goggles that if it is tilted up from the eyes it offers glare protection from a "high sun", whilst allowing the pilot to look under and have an unrestricted view of the objective.

High-speed jet aircraft have no specific damaging effect on the airman's hearing. High noise levels do exist in these aircraft, however, from which he must be protected just as in piston-engined aircraft. This is done by wearing a well-fitting flying helmet where the intercommunication telephones are inserted into specially built protective capsules which fit the head around the ear. It has been shown that the noise exclusion in fact compares very favourably with that of the best ear plugs.

With the increased rates of descent of high-speed aircraft, which, for maximum endurance, remain at height as long as possible before making rapid descents of 8,000 ft./min. or more, there is an increased possibility of damage to the ear drum if aircrew members are not careful. For this reason it is now particularly important that aircrew do not carry out such descents when suffering from any congestion of the eustachian tubes such as is associated with a head cold. The rapid increase of pressure on the outside of the ear drum would cause a rupture of the drum unless the pressure could be compensated by an equal pressure increase on the inside of the ear drum through the eustachian tubes. The pressure on the inside of the ear drum can be increased voluntarily by nipping the nose and blowing forcibly if the eustachian tubes are not completely blocked.

## 8. ESCAPE FROM AIRCRAFT

At aircraft speeds above 300 knots it becomes almost impossible to effect an exit from an aircraft without some mechanical assistance. This is mainly attributable to the high wind speed, the danger of hitting a part of the aircraft (particularly the tail of the machine) and lastly because of buffeting and high "g" levels forcing the body back into the seat, if the aircraft is out of control. The best method, so far developed, for getting the airman clear of his aircraft in an emergency is seat ejection. This entails firing the man in his seat up guide rails by means of an explosive charge attached to the seat. The acceleration of the seat is carefully chosen so that no damage is caused to the man during the ejection. The seat and man are thus thrown clear of the aircraft, when the airman undoes his safety harness, leaves the seat and opens his parachute in the normal way. This device is used in most modern jet aircraft and has proved most successful. In later models it is possible to remove the man from the seat automatically once he is clear of the aircraft and also open his parachute for him at a safe height. There is a supply of emergency oxygen stowed in ejection seats which is automatically turned on when the seat leaves the aircraft so that the airman does not become anoxic during his descent. The airman's parachute, dinghy, and some survival pack suitable for the terrain over which he is flying go to make up the ancillary equipment in the seat.

In the case of the multi-crew aircraft the possibility of emergency escape in a jettisonable cabin is considered possible. It is however

difficult to achieve, not only because of the complexity of severing the front of an aircraft, with all its connections, from the remainder but also because it is necessary to slow the rate of descent of the cabin sufficiently to allow subsequent escape from it, or else to allow it to land with the crew still in their seats. The jettisonable cabin would have the advantages of offering protection from cold and air blast at high altitude. It would also enable the crew members to remain together which may be most valuable during subsequent survival on the ground in hostile territory.

## PSYCHOLOGICAL PROBLEMS

Many of these problems have already arisen previously and so need not be repeated.

The apparent difficulties which are associated with the operation of high-speed jet aircraft are not those of basic aircraft handling. Indeed, from the point of view of take-off and landing, the aircraft is easier to handle than its piston-engined counterpart. This is accounted for by the fact that the absence of propellers rotating in the same direction obviates the problem of the resultant torque tending to turn the aircraft off a straight path. There is, however, the psychological stress of operating a high-speed aircraft to the limit of its speed and endurance.

The whole picture of psychological stress is a large and complicated one since there are so many variable facets to the problem. The very fact of operating a supersonic "missile" in an atmosphere which by virtue of low temperature and lack of oxygen is not compatible with life must create stress.

Navigation at such speeds and height is not easy and is in most cases dependent on radio aids which can fail. This is associated with the problem of descent at the end of the trip, in many cases through thick cloud, when the serviceability of a radio set may be the limiting factor between success and failure. For these and many other reasons it is essential that the pilot and machine are well prepared for the task in hand. The pilot must be physically and mentally fit and have a thorough knowledge of his aircraft and equipment. The aircraft cockpit must be comfortable and well planned so that fatigue is kept to the minimum.

The design and equipment of the aircraft of the future for high speed high altitude performance is a difficult and exacting task for the engineer and his medical colleague.

T. G. DOBIE

The author wishes to express his thanks to Air Marshal Sir James Kilpatrick, K.B.E., C.B., Director General Medical Services, Royal Air Force, for permission to publish this article and to Group Captain W. K. Stewart, C.B.E., A.F.C., for his helpful advice and criticism.

## CHAPTER XXXII

### FOREIGN AIR FORCES

By H. F. KING  
*Assistant Editor, "Flight"*

STUDY OF this annual survey of equipment used by the world's air forces shows that American military aid has been the predominant influence behind such changes as have taken place in the balance of power between smaller air forces. In Europe and the Near East, such aid has usually taken the form of deliveries of F-84 Thunderjet fighter-bombers and T-33 jet trainers. Additionally, America has allocated no less than £50m towards production of 450 Hawker Hunters for N.A.T.O. air forces and a further £31m for French-built Mystère 4 fighters. Substantial deliveries outside countries of origin, however, are not likely to begin before 1955. At the time of writing it is expected that recent cuts in R.A.F. orders for jet aircraft will enable export of several types—notably the Vampire, Venom, Meteor and Canberra—to be expanded; this should result in an early increase in the defensive strength of several friendly nations both within and outside the North Atlantic Treaty Organisation.

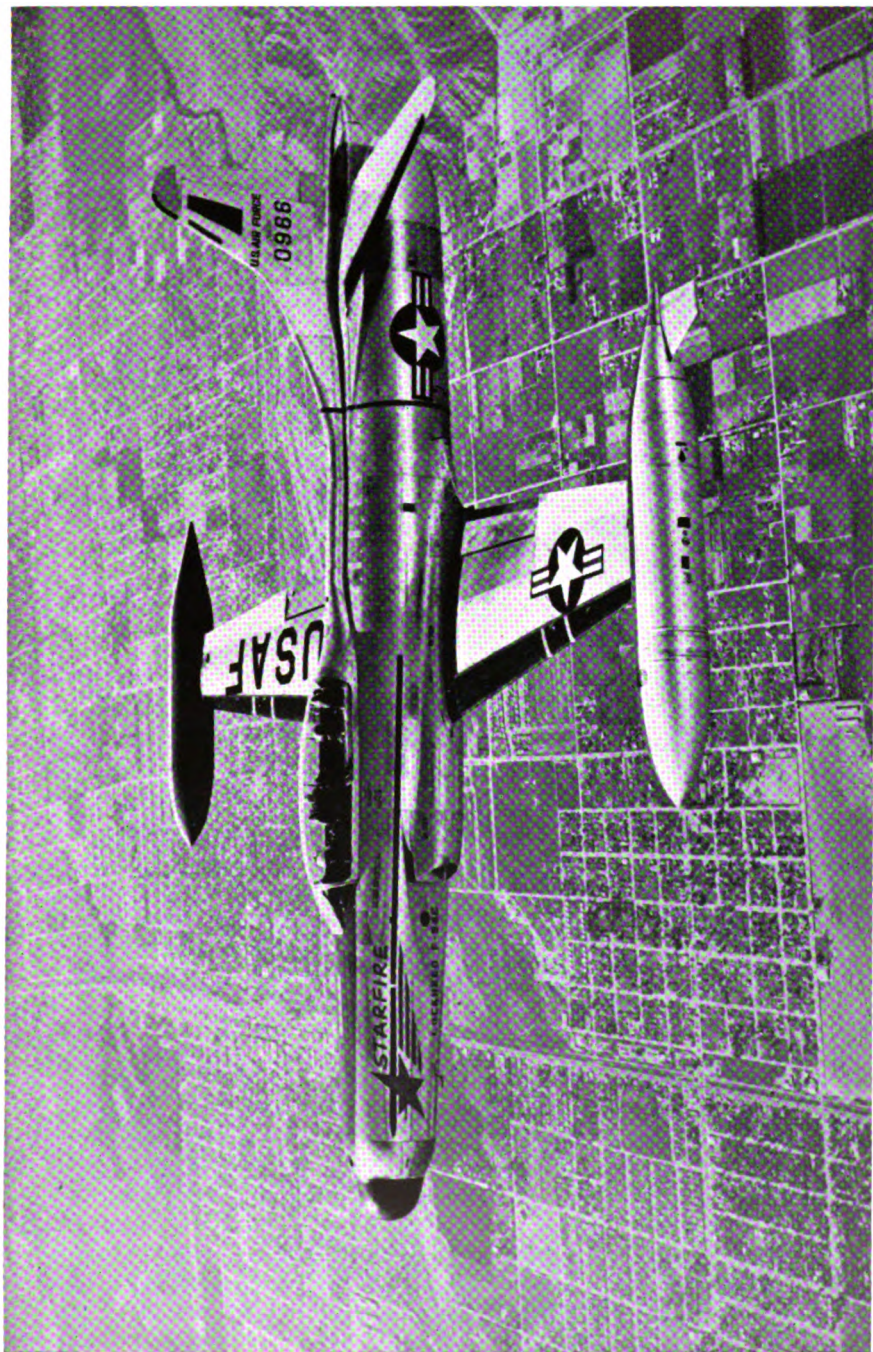
America's determination to maintain the world's most powerful and well-equipped Air Force—where necessary, at the cost of the other services—has not relaxed during the past year. In particular, strong efforts have been made to build up an effective force of jet bombers, and some 400 B-47s have now been delivered. Although news of recent Soviet air progress has been limited in both quantity and quality, the use of modern jet aircraft by Satellite countries suggests that the Russian Air Force itself has reached a very advanced stage of re-equipment.

#### ARGENTINA

The Meteor 4 remains the standard interceptor of the Argentine Air Force, although of a more advanced swept wing machine of local design and manufacture—the Nene-powered Pulqui II—has been adopted as a replacement. Two prototype Pulquis have been destroyed while on test, and the type is not thought to have reached the stage of squadron service. In appearance, the aircraft resembles closely the Mig-15; it was designed—by Kurt Tank, of Fw 190 fame—to have a maximum speed of 646 m.p.h. and ceiling of nearly 50,000 ft. Lancasters and Lincolns are used for bombing and reconnaissance, and the variety of equipment employed by transport units includes other British types: the Viking, Bristol Freighter, Dove, and Consul. Standard light bomber is the Argentine-built Calquin.

#### BELGIUM

The process of re-equipping Belgium's small but well-trained Air Force is now almost complete. Meteor 4s and 8s are the standard day fighters, supplemented by a reserve of Spitfire 14s. America has supplied F-84E Thunderjets for tactical duties. At least one squadron of Meteor N.F.11 night fighters is fully operational, and Mosquito N.F.30s are



Lockheed Starfire All-Rocket Jet-Fighter





disappearing from service. Chipmunks, SV-4Bs, Tiger Moths, Oxfords, and Harvards are used for basic and advanced training, and the majority of operational conversion training is carried out in Meteor 7s and T-33s, Spitfires, and Mosquitoes. For transport and communications, a selection of British and American types employed includes the Skymaster, Dakota, Anson, Proctor, and Auster A.O.P.S. The Hunter—possibly manufactured under licence by Fokker—has been adopted for future Belgian fighter squadrons.

#### BRAZIL

Early this year details were released of a barter deal by which the Brazilian Air Force will receive from Britain, in exchange for cotton, its first jet fighters—sixty Meteor 8s. In addition, ten Mk 7 Meteors will be supplied for advanced training. It seems unlikely, therefore, that Brazil will exercise the recently acquired licence for local production of the single jet Fokker S-14 Mach-trainer. Some F-47 Thunderbolts of war-time vintage are still in service, as are a number of North American Mitchell light bombers; reports indicate that the latter may be succeeded by British Canberra bombers. Training is carried out mainly with Harvard-type and twin-engined Beech aircraft. Other machines used by the Brazilian Air Force are Dakotas and Lodestars (transport), Catalina flying-boats (patrol and survey), and Goose amphibians (liaison and rescue).

#### CZECHOSLOVAKIA

It has been officially stated that, with Russian assistance, the Czech aircraft industry has become capable of producing jet aircraft, but the types under construction are not known. Proof that Mig-15s have been delivered to C.A.F. units came in March, when two of these advanced fighters, wearing Czech markings, shot down a patrolling American Thunderjet over Austria. It is likely that the Me 262s acquired by the C.A.F. shortly after the war have since been replaced by Soviet fighters, notably Yak-15s. Piston-engined machines in service include the Me 109G, La-5 and La-7 (fighters and advanced trainers), Il-2s and Il-10s (ground-attack) and Pe-2 (light bombers). Among the light trainers are a number of Czech-built Avia C-2s (similar to the German Arado 96B).

#### DENMARK

Supplied by Britain and paid for by American "off-shore" funds, Meteor N.F.11 night fighters are the latest additions to the strength of the Royal Danish Air Force. At least one squadron is in operational trim. Otherwise, equipment is largely as outlined in the last edition of this Annual: Meteor 4s and 8s for day interception; Spitfires and Meteor 7s for fighter training; and Chipmunks, KZ-2s, Harvards, and Oxfords for basic and applied flying-training. Standard A.O.P. machine is the KZ-10, a high-wing monoplane with a remarkable speed-range—from 30–134 m.p.h.; one squadron of twelve KZ-11s is in service.

#### DOMINICA

Wartime American and British aircraft continue in service with the Dominican Air Force. The fighter-bomber squadrons are equipped



with Mustangs (among them a number recently discarded by the Swedish Air Force), Lightnings, Mosquitoes, and Beaufighters. Heavier types are all American—B-17 bombers, Catalina amphibians, and C-46 Commando transports.

### EGYPT

Britain has supplied to the Egyptian Air Force a total of 14 jet aircraft—Vampires and Meteors (Mk. 4 and Mk. 7)—and these form the main front-line fighting strength. The jet fighters are backed up by a few squadrons of piston-engined Hawker Furies, Supermarine Spitfire 22s and 9s, Macchi C.205s and G.55s. No bombers are in service; transports and trainers are of British and American manufacture.

### FINLAND

Under the terms of Finland's peace treaty with the Soviet Union, the Finnish Air Force is limited to a strength of 60 aircraft and 3,000 men. Maintenance of a bomber force is not permitted. Fighters in service are Me 109Gs and a few Vampire 52s, which were delivered early this year. The 280 m.p.h. Vihuri, powered by a Finnish-built Bristol Mercury engine of 840 h.p., is a standard trainer; about 30 are in service.

### FRANCE

Until this year, the Armée de l'Air had relied on aircraft of non-French origin for its post-war first-line strength. However, delivery has now been made of well over 100 of the 350 Dassault 450 Ouragan jet fighters ordered in 1950. Powered by a French-built Rolls-Royce Nene turbojet (5,000 lb. s.t.), the Ouragan is a sturdy low-wing machine of orthodox design, having a circular air-intake in the nose and short tail-pipe. Four 20 mm. guns are mounted in the nose, and provision is made for carrying 16 rocket projectiles. Tip-tanks can be fitted to increase endurance. A reconnaissance version is reported to carry both oblique and vertical cameras, with reduced armament of two 20 mm. guns. A top speed of 600 m.p.h. (sea level) is claimed, and the initial rate of climb is some 8,500 ft/min. dropping to 3,500 ft/min. at 30,000 ft. Maximum ceiling has been quoted as 49,000 ft. By contemporary standards the Ouragan's take-off is fairly short—only 656 yd. This serviceable fighter has been developed into the outstanding Mystère 2, which has been provisionally ordered in large numbers (a figure of 320 aircraft has been mentioned) and compares favourably with the Sabre, Hunter, and Swift. Powered alternatively by the French axial-flow Atar turbojet or the Hispano-built R.-R. Tay, the Mystère 2 is capable of attaining 660 m.p.h. at sea-level. The improved performance is due partly to the embodiment of 30° of sweep-back in the wing design. With sharper sweep-back (40°) and a thinner wing, the new Mystère 4 is capable of an even higher speed—of around 670 m.p.h.—and has been dived at supersonic speeds. Production of the Mk. 2 may now be delayed in favour of the higher-performance Mystère 4. Yet another promising Dassault design is the Mystère de Nuit, a two-seat variant carrying radar in the nose for night and bad-weather interception duties. Plans have been announced for improving the performance of both Ouragans and Mystères by incorporating, at a

later date, afterburners of French design. One correspondent has reported the construction of a delta-wing fighter prototype in the Dassault factory at St. Cloud.

Other French fighter production has centred mainly on the Mistral—a Nene-powered Vampire development from the S.N.C.A.S.E. concern. This company has recently built, under licence, the first batch of a large Naval order for Sea Venoms. Large numbers of British-built Vampires, delivered before 1950—when S.E. first began production of the original Goblin-powered version—are still in service. American-supplied F-84 Thunderjets are also in large-scale service, and Lockheed T-33s are used for jet conversion-training. Some Meteor 11 night-fighters have recently been delivered from Britain.

Despite ambitious plans for producing jet bombers, and development flying by a number of prototypes, the French Air Force is still using obsolete piston-engined bombers. Fairly recent acquisitions are the B-26 Invader light twin-engined bombers on active service in Indo-China. Dakota, Languedoc, and Ju 52 transports will gradually be replaced by the Hercules-powered Nord 2501 twin-boom aircraft, which resembles the Fairchild Packet. Liaison and light-transport duties are undertaken by Dassault 315 Flamants, 300 of which have been delivered. Hiller 360 and Westland-Sikorsky S-51 helicopters in service will later be supplemented by larger S-55s built under licence by S.N.C.A.S.E. Advanced trainers in fairly wide service include the M.S. 474-7 series and the Sipa S.12. Fouga Magister two-seaters, powered by two 880 lb-thrust Palas turbojets, may be adopted for advanced training.

The French Naval Air Arm (*l'Aéronautique Navale*) operates three aircraft carriers. Deck-landing types used are mainly of American manufacture, including the Corsair, Bearcat, and Helldiver dive-bomber. The Sea Venom is in production as a replacement for the piston-engined fighters. A strike aircraft capable of a combat speed of 560 m.p.h., the Bréguet 96 Vultur is unusual in having composite power—one Nene installed in the fuselage and a nose-mounted Mamba turboprop. Endurance when cruising with the Mamba only is 4 hours at 233 m.p.h. Patrol and reconnaissance work is carried out chiefly by the Lancaster, Sunderland, Catalina, and Sea Otter.

### GREECE

The Royal Hellenic Air Force is among those chosen to receive F-84 Thunderjets from America under the Mutual Defence programme; T-33 jet trainers have already been supplied to facilitate conversion training of pilots still flying Spitfires and Helldivers. Reconditioned Cornell basic trainers have also been sent from America. Standard transport and general-purpose aircraft in service include the Dakota, Oxford, and Anson.

### HOLLAND

Dutch production of 300 Meteor 8s—of which delivery has been divided between the Belgian and the Netherlands Air Force—is now practically complete. Pending the delivery of “off-shore” Hunters, the Meteor will remain the standard interceptor. Several squadrons of Thunderjets are used in the fighter-bomber role; both two-seat Meteors and Lockheed

T-33s are employed for jet-conversion training. No jet night fighter has yet been adopted for the Netherlands Air Force, and the only bombers are a few Mitchells. Transports in Dutch service include the Dakota and Lockheed 12A. The Harvard is the standard single-engined advanced trainer, basic instruction being given in the Tiger Moth and Fokker Instructor. An order was to have been placed for the Fokker S-13 advanced twin-engined trainer, but the requirement was met instead by a gift of 40 Beechcrafts from America. Sikorsky S-51 and S-55 helicopters are also being supplied. The Fokker S-14 jet trainer, which in Nene-powered form would be capable of 515 m.p.h. (the first prototype has a Derwent) has been adopted, and 20 are to be produced.

### INDONESIA

Equipped largely with aircraft used by the former Netherlands East Indies Air Force, AURI (the independent Indonesian Air Force) consists of three squadrons. The first is a transport unit using Dakotas, the second is a composite tactical unit with Mustangs, Mitchells, and Catalinas, and the third carries out reconnaissance duties with Austers and Piper L-4s. Vultee BT-13s and Harvards are the standard trainers, and there are a few Hiller 360s for rescue work.

### IRAN

Hurricanes and Thunderbolts are still used as fighters by the Imperial Iranian Air Force; the only other "first-line" equipment consists of a few Ansons modified for light bombing duties. Reconditioned Fairchild Cornell trainers were recently purchased to replace the Tiger Moths previously employed.

### IRAQ

The news that Vampire Trainers are in production for Iraq suggests that the Royal Iraqi Air Force may shortly replace its Hawker Fury fighter-bombers by Vampires. Iraq employs mainly British aircraft, including the Dove, Anson, and Tiger Moth.

### ISRAEL

Pilots of the Israeli Air Force are now being trained in modern jet-fighter technique, following delivery of a batch of Meteor 7 two-seaters. Single-seat Meteor 8s have been added to the existing fighter force of Spitfires and Mustangs. The Israeli Air Force has also acquired eight of the Mustangs recently released by Sweden. The other "operational" Israeli types are bombers—the Mosquito and B-17 Fortress. Transports include the Dakota and Commando (as used by the State airline, El Al). Fokker Instructor and Harvard trainers predominate among the miscellany of small single-engined aircraft in service.

### ITALY

De Havilland Venoms (of the two-seat, all-weather variety) are now in production for the Italian Air Force at three national factories, and two more Italian concerns are making the necessary Ghost turbojets. Vampire 5s and F-84 Thunderjets have been in service for some time, and the

retirement of practically all the piston-engined fighters—Mustangs, Thunderbolts, and Lightnings—is now imminent. Dakota transports are augmented by a variety of Italian craft, mainly of Fiat and Savoia-Marchetti manufacture, together with a few Cant Z.506B seaplanes and some small Macchi 308 four-seaters. Fiat G-59s, Harvards, Fokker Instructors, Piaggio P. 148s and Ambrosini S.7s are used for training. No order has yet been announced for the tandem-seat Fiat G.80 despite the high standard of design and construction shown by this Goblin/Ghost-powered jet trainer; the continuing prospect of an American “gift” of jet trainers may well have reduced, if not cancelled out, the prospect of an order. Italian interest in light fighters of the Folland Gnat type is shown by the very neat conversion of an Ambrosini S.7 basic trainer into a small jet research aircraft. Wings and tail were swept back, and the 225 h.p. Alfa engine replaced by a Turbomeca Marbore of 840 lb. thrust; the resulting design may be developed into an interceptor capable of supersonic speed.

#### LEBANON

One British aircraft company—de Havilland—has met all the main requirements of the Lebanese Air Force with three comparatively recent types of aircraft—Chipmunk, Dove, and Vampire.

#### NORWAY

The Vampire Trainer is the only modern type to have been adopted by the Royal Norwegian Air Force in the past year. Single-seat Vampire 3s and 52s were already in service with fighter squadrons, together with F-84E Thunderjets and Spitfires. Mosquito fighter-bombers are still used. The transport squadrons fly Dakotas and Lodestars.

#### POLAND

Light trainers and sailplanes are the main products of the Polish aircraft industry, and the country's air force is equipped mainly with machines imported from Russia. This equipment is thought to be of good quality and includes some Il-28 jet bombers. At least one squadron of Mig-15s was in service earlier this year, but the standard equipment of interceptor units was believed to be the slower, straight-wing Yak-15. For tactical bombing and ground-attack work, two types of piston-engined machine are employed: the Il-10 and Pe-2. Piston-engined Yak-9 fighters have probably been relegated to advanced-training duties, which may be taken over by Yak-15s as further Migs are delivered. Prominent among light trainers are the Po-2 biplane and Ut-2 two-seat monoplane. One of the two Polish pilots who absconded to Denmark in Mig-15s last March estimated the front-line operational strength of the Polish Air Force as 300 aircraft, 120 of which were jet-powered. He added that a number of Russian officers commanded various units of the service.

#### RUSSIA

As in previous years, a great deal of information has been published over the past 12 months on the size and composition of Soviet air strength—although the bulk of it lacks positive corroboration. An American journal has credited Russia with a first-line strength of 20,000 aircraft; another source estimates that 22,000 aircraft—half of them fighters—were

produced by the Soviet industry during 1951. Reports from Germany suggested that nearly 800 jet fighters were stationed in East Germany alone early this year, together with 250 fighter-bombers, 150 jet bombers, 50 transports and 30 reconnaissance aircraft.

As to the quality of Russian equipment, captured Mig-15s have displayed a high degree of workmanship and great ingenuity of design. Russian transport aircraft in airline service with Satellite countries have also been subjected to close scrutiny; here, too, the standard of construction has proved to be high, although the designs are less inspired.

A good deal has been known about the Mig-15 since 1951, when a damaged example was flown from Korea to the United States and broken down into components for study. An opportunity to evaluate the Russian fighter's performance characteristics came in March this year, when a Polish Air Force pilot, seeking political asylum, safely landed a Mig on a grass airfield at Bornholm, Denmark. A similar incident took place two months later.

The importance of the Mig-15, both as a weapon and as a prime example of Soviet aeronautical progress, justifies a brief recapitulation of some salient points concerning its evolution and abilities. A research team under M. Gurevitch (a team which included German fighter-design experts) began work on the project in 1946 and the prototype first flew on July 2, 1947. A few months earlier the first Nene had arrived from England, and the airframe was modified to take this powerful centrifugal unit instead of the German axial originally specified. Designated RD-45, Russia's version of the British turbojet has been developed to give nearly 6,000 lb. s.t. (compared with 5,000 lb.), which can be increased by a further 750 lb. for take-off. Water-methanol injection is the method of power-boosting, and there is no evidence that an afterburner has been used although fuselage design would permit such an installation. Three internal fuel tanks have a total capacity of 330 (U.S.) gallons which can be augmented by a further 320 gall. in underwing tanks. Maximum range is probably in the region of 600 miles on internal fuel only and over 1,000 miles with drop-tanks. Up to 1,100 lb. of rockets or bombs can also be carried under the wings. Standard armament is generally quoted as one 37 mm. and two 23 mm. guns, as carried by the specimen flown to Denmark. Estimated performance data for the Mig-15 include: maximum speed, 672 m.p.h.; stalling speed, 105 m.p.h.; initial rate of climb, 10,400 ft/min.; service ceiling, 51,000 ft. At extreme altitudes the speed, particularly in the dive, is restricted by the limiting Mach Number of 0.89. The Mig's radio equipment is reported to be of excellent quality and instrumentation is described as "adequate".

The first aircraft to land at Bornholm was described by its pilot, Lt. Jarecki, as a Mig-15 bis, capable of between 685-745 m.p.h. in level flight, whereas earlier Migs had a top speed of 665 m.p.h. The pilot gave the endurance (with drop tanks) as 2 hours at a height of 49,000 ft., and the all-up weight as 11,085 lb. He confirmed that, to his knowledge, no Mig-15 had flown at supersonic speed.

Of comparable layout and, presumably, performance, is another fighter known generally as the La-17. While its existence can be proved, this machine is not thought to be in large-scale service. Yak-9 and La-11 piston-engined fighters have also seen service in Korea, but little has been

heard of the two main types of straight-wing single-jet fighter—the Mig-9 and Yak-16. A “delta-wing night fighter with two heavy cannon and radar equipment” is said to have appeared over Korea, but the authenticity of this report is uncertain. Likewise, there is no clear proof of various reports of radar-equipped Mig-15 all-weather fighters and two-seat training versions, although such developments are probable.

Tu-2 and Pe-2 piston-engined tactical bombers are still in service, but in diminishing numbers. The standard Soviet light bomber, one comparable in some ways with the Canberra, is the twin-jet Il-28, which has been observed in large numbers over Eastern Germany. The designation U-Il-28 has been applied to a trainer version. The Il-28 has swept-back tail surfaces and a straight, high-placed wing, beneath which are suspended two unusually long nacelles housing turbojets thought to be of Nene type. It normally carries a crew of three or four, including a tail gunner.

Standard heavy bomber of the Soviet Air Force is the Tu-4, a copy of the B-29. Some hundreds are in service, of which some are reported to be capable of air-launching Mig-15s by means of a girder attachment under each wing. The installation of 3,000 h.p. Russian-designed engines, in place of 2,100 h.p. units of original American design, is said to have given the latest Tu-4s a performance comparable with that of the B-50. Very sparse information is available on the subject of jet and turboprop long-range bombers under development for the Soviet Air Force. The Boeing Airplane Company has issued some details of the “Type 31” earlier referred to by the U.S.A.F. Chief of Staff and the Air Secretary, stating that its all-up weight is in the region of 350,000 lb. Other sources give a span of over 220 ft. and length of 167 ft. for this machine, which is variously described as having six turbojets or six turboprops, crew of 22, and five gun positions. The American journal “Fortune” reports that Russia’s long-range bomber force, with a strength of 1,000 aircraft, matches—in numbers at least—the U.S.A.F. Strategic Air Command; but there is no means of corroborating this estimate.

Transports used by the Soviet Air Force—the Tu-70 (a 72-seat version of the Tu-4), Il-12 and Li-2—are supplemented by a number of freight- and troop-carrying gliders. For light-transport, A.O.P., and ambulance duties, the comparatively new Yak-14 and the ancient Po-2 biplane are largely employed, but some helicopters have recently been delivered, including a useful four-seater attributed to Mil. Most widely used of the Russian primary trainers is the 160 h.p. Yak-18, on which nearly all military pilots receive their initial flying instruction; the Soviet equivalent of the transitional Harvard or Balliol is the 300 m.p.h. Yak-11, which has a 650 h.p. engine. Some obsolete fighters—both airscrew- and jet-driven—have been relegated to fighter-conversion training, and Pe-2 and Tu-2 bombers have also been adapted for the trainer role. Information on Soviet jet-trainer development is scanty.

#### SPAIN

Aircraft derived from Civil War types are still in service with the Spanish Air Force, which relies on a locally built version of the Me 109 as its standard fighter. Powered by a Hispano-Suiza engine, this aircraft was redesigned and reproduced by La Hispano Aviacion, and is known as the HA 1109J. Some standard German-built Me 109s are also in

service. The small Spanish bomber force is believed to consist mainly of a few C.A.S.A 211Ps, alias Heinkel He 111Ps, and Dornier Do 17s. Ju 52 transports are being augmented by the C.A.S.A. 201 Alcotan, a twin-engined ten-seater of national design. Basic and advanced trainers are of mixed Spanish and German origin.

#### SWEDEN

Sweden's Defence Budget for the financial year 1952/53 was no less than 1,500m Crowns (over £100m), which represents an increase of some 15 per cent on the previous year's allocation. The Royal Swedish Air Force, which received about a third of the total appropriation, has devoted over £20m to the purchase of new aircraft and equipment; additional Saab-29 jet fighters, to the value of £6m, represent the most important new order. Capable of exceeding 650 m.p.h. in level flight, this Ghost-powered, swept-wing fighter is described by a Swedish pilot as "one of the best defence weapons in the whole world". The fixed armament, consisting of four 20 mm. Bofors guns, can be supplemented by at least 16 rockets and other missiles, including napalm bombs. Several of the 30 day fighter squadrons have received J-29s, and the attack wings, at present using 355-m.p.h. piston-engined Saab-18Bs, will shortly be re-equipped with a special fighter-bomber version, designated A-29. The Saab concern has followed up its success with the "A-29" (known in Sweden as the "flying barrel") by developing the more powerful and comparatively rakish A-32 Lansen. This promising ground-attack machine is powered by a Rolls-Royce Avon, which is thought to confer a performance comparable with that of the Sabre. Production plans have not yet been announced. Development of a delta-wing all-weather fighter comparable to the Javelin is also believed to be well under way: a small aircraft for testing this configuration, the Saab-210, has been gathering preliminary data for some 18 months.

Sweden's Mustangs have now been sold, and the first line fighter strength consists entirely of jet-powered machines: twin boom Vampires and Saab J-21Rs, together with J-29s. Pending the introduction of Vampire Trainers, single-seat Vampires have been used for the conversion of pilots graduating to J-29s. The Venom N.F.2 has been chosen to replace the Mosquito as the standard Swedish night fighter.

Less modern is the equipment used by transport, reconnaissance, and rescue units, which still fly such machines as the Ju 86 and Do 24 and Catalina flying-boats. The large central training school at Ljungbyhed employs some hundreds of Harvards and Saab-built Bucker Bestmann trainers; the all-metal Saab-19B Safir, already used for liaison duties, was recently chosen to replace the Bestmann.

#### SWITZERLAND

There has been little change in the composition of the small but efficient Swiss Air Force, which is primarily defensive in character. Vampire 6s and Mustangs are the only first-line aircraft of reasonably modern design.

#### TURKEY

The Turkish Air Force is still in the process of graduating from obsolete wartime aircraft to modern equipment. Although America has supplied

several squadrons of F-84E Thunderjets (and Lockheed T-33s for conversion training), Mosquitoes and Invaders are the most up-to-date bombers available. Some Beaufighters, Spitfires and Thunderbolts are also retained. Transports and trainers are of mixed British and American origin, including the Dakota, Oxford, and Harvard.

#### UNITED STATES

With a 9 : 1 record of successes against the Mig-15 in combat over Korea, the North American F-86 Sabre has maintained its position as the most effective single-seat fighting aircraft in large-scale military service to-day. Four versions, sub-designated D, E, F, and H, are in production for the U.S.A.F. The F-86D is intended for all-weather interception duties and is provided with radar equipment for identifying and tracking the target and firing the armament of 24 "Mighty Mouse" 2.75 in. air-to-air rocket projectiles. Sperry Zero Reader blind-landing equipment is also incorporated. A scanner for the A.I. radar is housed in the redesigned nose; the rear fuselage has also been rectified to take an afterburner, which, for short periods, increases the thrust of the General Electric J-47 turbojet from 5,200 lb. to 6,500 lb. Sea-level maximum speed of this version is practically 700 m.p.h.

The basically similar F-86E and F-86F are normally used as day interceptors or bomber-escorts and carry an armament of six 0.5 in. machine guns. For ground-attack work, this battery is supplemented on the more powerful F-86H (which has the new J-73 turbojet capable of giving up to 9,200 lb. s.t.) by wing-mounted bombs and rockets. This duty has previously been carried out mainly by F-80 Shooting Stars and F-84 Thunderjets. The latter type has been developed almost beyond recognition by the sweeping-back of wing and tail surfaces and the installation of a 7,200 lb. s.t. Wright J-65 turbojet (A.S. Sapphire built under licence). Thus improved, it will be produced in large quantities as the F-84F; first models retain the nose air-intake which characterises earlier Thunderjets, but wing-root intakes may later be substituted. Standard armament of the F-86F is six 0.50 in. guns and up to 2,000 lb. of bombs or 24 rockets. Despite its more recent designation, the F-84G is in fact the latest type of straight-winged Thunderjet modified for refuelling in flight by the American "flying boom" method. An automatic pilot is fitted to lessen the pilot's duties on long flights in jet fighters, which have extended, on occasions, to over 12 hours.

Flight refuelling of an F-80A over Korea in September, 1951, enabled a pilot to remain in or near the target area for an entire day, making several attacks on ground objectives in the course of its 14 hr. 25 min. flight. Normally, however, its application is confined to long delivery flights, such as Operation "Fox Peter Two", in October, 1952, when 75 F-84s flew from California to Japan in two mass formations which landed only once en route.

Standard night and all-weather fighters of the U.S.A.F. are, in addition to the new F-86D, the Lockheed F-94 Starfire and the Northrop F-89 Scorpion. Both aircraft carry, in latest form, an all-rocket armament. The F-94C, a two-seat development of the F-80 Shooting Star powered by a 6,250 lb. s.t. J-48 turbojet (R.-R. Tay), carries its 24 rockets in a ring of tubes around the nose of the aircraft. The Scorpion's thin wings are not swept back, but the two J-35 turbojets with afterburners are claimed



to give a level speed of well over 600 m.p.h. Rockets are carried in large wing-tip containers.

Among new fighters under development for the U.S.A.F., two projects which merit special mention are the Sabre 45 (F-100), which will have 45 degrees of sweep-back compared with 35 degrees on the F-86, and the Convair F-102. Based on the XF-92A delta-winged research aircraft, the F-102 is expected to be a supersonic, fully automatic fighter carrying a guided missile; the pilot will be required only to monitor the electronic control system.

America's Strategic Air Command now employs both piston engined and jet medium bombers, and heavy bombers using both forms of power. Boeing B-29s and B-50s are being supplemented by the six-jet B-47, which is in large-scale production at three factories. (Upwards of 700 are on order, of which over 400 were reported to have been delivered at the time of writing.) A tactical radius of 1,200 miles has been estimated for the B-47, but this can be extended by use of long-range tanks (one 1,780-gallon tank can be mounted between each pair of engine "pods") or with the aid of flight-refuelling. Bomb-loads of up to 20,000 lb. are claimed, but the range corresponding to such a load is not known. The B-47's maximum speed is "over 600 m.p.h.," but the carriage of a large weight of bombs plus fuel sufficient for a useful range is believed to have a restrictive effect on performance.

Very long-range bombing and reconnaissance is undertaken by the "intercontinental" Convair B-36, weighing 170 tons and capable of carrying 10,000 lb. of bombs for 10,000 miles. Some 170 B-36s and RB-36s (reconnaissance versions) are now in service; no fewer than 106 were severely damaged by a cyclone which swept Fort Worth, Texas, in the summer of 1952, but the majority have been restored and returned to the squadrons. The desire to blend B-36 range performance with jet-bomber speed led the U.S.A.F. to sponsor development and construction of the massive Convair YB-60 and Boeing YB-52 prototypes, both of which have been flying since April, 1952. Production orders were placed for the latter, but a recent report suggests that only small quantities will be built—as reconnaissance aircraft and flying tankers. The B-36 is powered with six 3,500 h.p. piston engines and four J-47 turbojets; the B-52, its successor, has eight J-57 turbojets. With its swept-back wing and tail surfaces, and "pod"-mounted turbojets, the B-52 appears a scaled-up version of the B-47. A number of the comparatively old B-54 four-jet bombers remain in service but this type is employed primarily in the reconnaissance role. Standard light bomber of the U.S.A.F. is still the B-26 Invader, but the American-built Canberra (Martin B-57A) is in sight as a replacement. Powered by Wright-built Sapphire turbojets, American Canberras will be used primarily in the night-intruder role. Heavier than R.A.F.-operated Canberras, B-57s will carry a crew of two, instead of three, and a tail parachute may be incorporated to shorten the landing run on short or slippery runways.

Increased U.S.A.F. acceptance of the value of flight refuelling has led to the production of special tanker aircraft, denoted by the prefix "K". Leading examples of such aircraft are the KB-29 Superfortress and KC-97 Stratofreighter (capable of conversion for normal trooping, supply, and ambulance work). Similarly, "R" indicates adaption of a fighter or bomber

for strategic or tactical reconnaissance, as in the case of the RF-80 Shooting Star, RF-84-F Thunderjet, RF-50, and RB-36. Orders are in hand for the RB-66, a twin-jet machine of high performance developed from the Douglas A3D Naval attack bomber.

Transport aircraft in American military service include a number of types better known as airliners, notably the C-121 (Constellation), C-97 (military Stratocruiser), DC-6, DC-4, and, of course, the perennial Dakota. Essentially of service origin are the twin-boom Fairchild C-82 and C-119 Packet and Douglas C-124 Globemaster, which is capable of carrying nearly 200 armed men. For "assault-transport" duties—which demand the ability to operate from restricted fields in forward areas—the Chase C-123, fitted with two 1,900 h.p. piston engines, has been adopted. Four turbo-props power the high-wing Lockheed C-130, of which a prototype is under test, and a turbo-prop development of the Globemaster is also projected.

Light-transport duties are undertaken chiefly by the Ryan L-17B Navion and Canadian-built L-20 Beaver; the latest liaison and A.O.P. type to be adopted is the Cessna L-19A Bird Dog, a development of the civil Model 170 B two-seater.

Training in the U.S.A.F. normally begins with the North American T-6 Harvard, although the post war L-28, with tricycle undercarriage, is now appearing in numbers. Twin-engined conversion training is being carried out largely with converted Beech C-45 light transports; the Beech T-36 is an advanced trainer with two 2,300 h.p. R-2800 engines, which can also be used as a 12-seat transport. For advanced twin-engined pilot and navigator training, the Convair T-29 and North American B-25J are employed. Standard jet conversion trainer of both the U.S.A.F. and U.S. Navy is the Lockheed T-33, which has a lengthened fuselage housing instructor and pupil in tandem beneath a clear-vision canopy.

Helicopters are now used in large numbers by the U.S.A.F.; types in service include the Bell H-13, Hiller H-23, and Sikorsky H-5, H-18, and H-19. Of these single-engined, single-rotor machines, used mainly for liaison and rescue work, the largest and most recent is the H-19 ten-seater (produced by Westland in Britain as the S-55), two of which completed a successful Atlantic crossing last year. Twin-rotor Piaseckis, notably the H-21 Work-Horse, also in service, are capable of carrying up to 20 troops. As an Arctic rescue vehicle, the H-21 is capable of lifting 12 stretcher-cases.

Well to the forefront of the U.S. Navy's powerful array of carrier-borne aircraft—of which a large percentage are turbine-powered—is the North American FJ-2 Fury. This is a naval version of the F-86E Sabre, from which it differs mainly in having folding wings, a new gunsight, improved ejection seat, and four 20 mm. guns instead of the familiar "50-calibre" weapons fitted to its land-based predecessor. Front-line Naval jet fighters already established in service are the well-known F9F Panther and F2H Banshee. A swept-wing version of the former, designated F9F-6 Cougar, has been evolved, but will be produced in limited quantity only. The F7U Cutlass is a radical twin-jet tailless fighter whose introduction to Naval service has been somewhat protracted; the first proptotype flew five years ago, but production aircraft are only just reaching the squadrons. Little is known about more recent fighters developed for the U.S. Navy,

of which two are in production: the water-based Convair F2Y delta and the McDonnell F3H Demon, a speedy-looking swept-wing fighter of fairly conventional layout. The Douglas F4D Skyray, another single-jet interceptor, is generally accepted as being of delta-wing configuration. However, it differs from other machines of its type in having rounded wing-tips and slightly swept-back trailing edge. The Skyray is intended solely for interception after catapult launching from its carrier base.

The most advanced two-seat all-weather fighter in service is the Douglas F3D Skynight, which has been delivered in some numbers to Marine squadrons. It carries A.I. radar and the standard Navy armament of 20 mm. guns. Earlier this year an F3D was reported as having shot down four Communist aircraft in a single sortie over Korea. The Grumman Tigercat, with twin piston engines, is still employed on similar duties. A veteran piston-engined fighter which has been in Naval service for over ten years is the Chance-Vought F4U Corsair, still doing valuable work as a close-support aircraft over Korea. At least one of these 450-m.p.h. fighters has claimed a Mig-15. When production of the Corsair ceased at the beginning of this year over 12,700 had been built. Over 22 versions of the Douglas AD-4 Skyraider have been built for the U.S. Navy, and the number produced since the prototype first flew in 1945 has passed the 1,000 mark. Powered by a single 2,700 h.p. Wright R-3350 engine, the Skyraider was originally produced as a single-seat strike aircraft, but some anti-submarine versions have been modified to carry a three-man crew. Ship-based AD-4s have been used in large numbers against North Korean targets, carrying an offensive armament consisting of two 20 mm. guns, 12 rockets, and three 2,000 lb. bombs. Specially equipped AD-4s and Grumman AF-2 Guardians are used in the anti-submarine role; both types fly in pairs, one carrying search radar and the other, depth charges and bombs. The new twin-engined Grumman XS2F is designed to combine the functions of both "hunter" and "killer". In succession to the Skyraider, the U.S.N. has chosen the Douglas A2D Skyshark, powered by a 5,500 h.p. T-40 turboprop. This massive single-seater (it weighs over 23,500 lb.) is claimed to have a range of 2,000 miles and top speed of 525 m.p.h. Larger anti-submarine aircraft of the U.S. Navy are the famous Lockheed P2V Neptune, holder of the world's long-distance record (11,236 miles) and Martin P4M Mercator, which carries one J-33 turbojet in each nacelle of the two Wasp Major piston engines. Likewise composite-powered, the North American AJ2 Savage has two Double Wasps and a single J-33, mounted in the rear fuselage. It was designed to carry an atom bomb and, at 55,000 lb. gross weight, is the heaviest carrier-based aircraft. Non-carrier aircraft used by the U.S.N. for anti-submarine, patrol, search, and rescue work include the land-based four-engined Privateer (also employed on weather reconnaissance), the Martin Mariner and Marlin flying-boats, and the Grumman Albatross amphibian. Transports in current service include the Constellation, Super Constellation, and the Super DC-3. Convair's big turboprop flying-boat, the R3Y Tradewind, which was originally designed as an anti-submarine craft, has been adopted as a personnel and cargo transport. The Constellation is also used as a "radar picket" to detect aircraft movements by radar at high altitudes; this version of the famous transport, designated WV-2, carries its early-warning equipment in unsightly bulges above and below

the fuselage. Most of the Navy's training aircraft are specially developed versions of U.S.A.F. types, including the North American T-6 and T-28 and Lockheed T-33. The same is broadly true of helicopters; Bells, Piaseckis, Hillers, and Sikorskys are used in large numbers for training, liaison, transport, and rescue purposes. The new Bell XHSL-1, which has been awarded a Navy contract, is a powerful twin-rotor type specially designed for anti-submarine warfare.

#### VENEZUELA

Small but well-equipped, the Venezuelan Air Force operates Vampire and F-47 Thunderbolts in the fighter-bomber role, and has already taken delivery of several Canberras. Some Vampire Trainers have lately been shipped to Venezuela and assembled locally. Like most small South American nations, Venezuela uses trainers and transports (notably Dakotas) of United States manufacture.

#### YUGOSLAVIA

Until this year the Yugoslav Air Force has operated a selection of obsolete Russian machines, but the situation is now being changed by the arrival of more up-to-date American equipment. The first batch of jet trainers—four Lockheed T-33s—reached an airfield near Belgrade last March; these are being followed by an unspecified number of F-84 fighters. Meanwhile, Yugoslav jet pilots are being trained by the U.S.A.F. in America, Germany, and France. At the end of 1952 the first Yugoslav-built jet aircraft was reported to have flown, but the only details available are that it is an experimental machine, powered by two small French turbojets—Turbomeca Palas of 660 lb. thrust. Russian types serving in Yugoslavia include Yak-3 and Yak-9 fighters, Pe-2 light bombers, Li-2 transports and Po-2 trainers. Some German-built Ju 52 transports are still used.

H. F. KING

## CHAPTER XXXIII

### ROYAL AIR FORCE RESERVES

BY AIR VICE-MARSHAL W. M. YOOL,

#### POLICY

RESERVES are required in the Royal Air Force for two main purposes, firstly, to provide formed units capable of taking their place in the front line on, or shortly after, the outbreak of war, and secondly, to provide a pool of men who can be used to bring existing units up to their war establishment, to form new units, and to bridge the gap between the outbreak of war and the time it will take to train the first of the further reserves of aircrew and tradesmen who will be required as the war proceeds.

The formed units, capable of taking their place in the front line, are found by the Royal Auxiliary Air Force. The reserve pool includes the Royal Air Force Volunteer Reserve, whose members have an annual training commitment and who will be available for posting to units in an emergency, the ex-regulars who are still available for recall (including retired officers, the Royal Air Force Reserve of Officers and Class "E" airmen), the Class "H" Reserve, which consists of the National Service men fulfilling their 3½ years' reserve liability, and the Class "G" Reserve, which is the equivalent of the Army Class "Z", that is, men released after the last war but still liable to recall in an emergency.

#### ROYAL AUXILIARY AIR FORCE

The squadrons and units of the Royal Auxiliary Air Force are closely linked to the civil communities in the areas where they are recruited, and to the appropriate Territorial and Auxiliary Forces Associations. They are controlled by special legislation, and they can be called up for Home Defence by Order in Council in advance of the proclamation of a state of emergency. Their standard of training is designed to enable them to take their place in the front line at short notice, and they are therefore a particularly valuable addition to our first line strength.

The Royal Auxiliary Air Force includes Fighter Squadrons, Fighter Control Units, and Radar Reporting Units under the control of Fighter Command, and a Transport Squadron, Light Anti-Aircraft Squadrons of the Royal Air Force Regiment, and Air Observation Post Squadrons under the control of Home Command.

The Auxiliary Air Force has been going through a rather difficult period in the past two or three years and most units are undermanned. The main reason for this is probably the National Service system. Understandably, many men feel that with conscription in operation they are not prepared to undertake the additional obligation of voluntary training after they have finished their National Service, and this attitude particularly affects a force that has always prided itself on its purely voluntary nature.

The Fighter Squadrons are the most important units from the operational point of view. When the Squadrons were called up in 1951 for a

period of three months, which the Government has undertaken will not be repeated, they were raised to a high pitch of efficiency, comparable at the time to that of a regular squadron. Since then it has not been possible to maintain that standard and it is probable that a short working up period would be necessary in war.

The Fighter Control and Radar Reporting Units are as important as the Fighter Squadrons, as they are an essential part of the control and reporting system in war and have to be ready to man their war stations at short notice, when one of their main functions will be to operate their stations in an emergency for a few days, until such time as reservists can be called up to make good the balance of the establishment required.

The other Auxiliary units are not so important as most of them are intended for operations overseas, and so would not be required to operate for some time after the outbreak of war. They are nevertheless a valuable contribution to our first line strength.

In view of the difficulty of manning the Auxiliary Air Force on a voluntary basis it is sometimes asked why the Royal Air Force does not adopt the Army system, and post National Service men during their reserve service into the Auxiliary units to bring them up to strength. The answer is that, apart from the fact that the Auxiliary units could only absorb a small fraction of the men available, the Auxiliary has a large training liability, so that, in addition to attending an annual camp, he has to do a lot of his training at weekends and in the evenings throughout the year. The National Service man as such is therefore of little use to an Auxiliary unit, as he has only a liability for 60 days' training in all during his 3½ years' reserve service, and this is done in annual camps only, not in the evenings or at weekends.

For this reason the Royal Air Force, unlike the Army, did not seek powers under the National Service Act to post men into Auxiliary units, although they can be attached and many National Service men do carry out their annual training with Auxiliary units at their annual camps. This has the advantage that it encourages National Service men to volunteer for the Auxiliary Air Force, and a number of recruits are found in this way.

#### ROYAL AIR FORCE VOLUNTEER RESERVE

The bulk of our aircrew reserves are in the Volunteer Reserve, which is recruited partly from ex-wartime and post war aircrew who have completed their regular service, partly from ex-National Service aircrew, who have to join either the Auxiliary Air Force or the Volunteer Reserve for the 3½ year period of their reserve service, and partly from young men who have obtained a private pilot's licence and wish to enlarge their flying experience. This latter category includes some men who have taken up flying after completing National Service, and some, such as air cadets who have gained flying scholarships, who have yet to do their National Service.

Aircrew in the Volunteer Reserve have to do 15 days' annual training and some training in the evenings and at weekends can be done where facilities are available. In all, the pilots have to complete a minimum of

20 hours flying per annum. This training is given at Reserve Flying Schools located at convenient centres throughout the country.

Owing to the expense that would be involved in keeping these men up to date on operational aircraft, they are only kept in practice on Moths and Chipmunks, although the use of the latter aircraft at least ensure that they are kept in instrument flying practice. As a result practically all reserve aircrew would require refresher training of some sort before they could take their place in an operational squadron in an emergency.

When our defence policy was reviewed at the end of 1952 by the Government it was decided that substantial economies could be made in the number of reserve aircrew maintained in flying practice. As a result the numbers are being gradually reduced by not offering extensions to the older and to the less experienced men. This has meant that seven of the Reserve Flying Schools were closed in the Spring of 1953 as being surplus to requirements and that a further seven schools were closed during the summer.

The University squadrons are an important part of the Volunteer Reserve, although the men have no liability to continue in the Reserve after they go down. There are 17 of these squadrons, which have their own aircraft and which aim at training the pilots to the basic flying standard during the three years' course at the University. In addition to pilots there is a navigator section at Cambridge, and this experiment may be extended to other Universities. There are also Fighter Control Flights, which include women, at some Universities, and two Airfield Construction Flights and two Technical Flights were formed last year at four Universities that already have flying squadrons.

Although a number of officers are recruited from the University squadrons, their primary object is not so much to assist recruiting as to help widen the knowledge of and interest in air matters throughout the community as a whole, in various walks of life, after the men have gone down.

Until 1952 the policy was to accept officers and airmen for all ground branches and trades in the Volunteer Reserve, and to give them part time training throughout the year in addition to their 15 days' annual training. It was found impracticable, however, to provide satisfactory part time training for the multiplicity of trades involved and the policy was therefore reviewed.

As a result of this review it was decided that Volunteer Reservists in the ground branches and trades would only undertake annual training in the future, and that there was therefore little object in allowing a National Service reservist to transfer to the Volunteer Reserve, where he would in future only be able to do same the annual training as he was already liable for under National Service. Entry to the ground branches and trades is therefore now confined to the more experienced officers and to the highly skilled advanced tradesmen, whose posts cannot be filled by National Service men. These posts are almost all of the kind, including in particular the electrical trades, which all three services are finding it difficult to recruit, and so far men have not been forthcoming in the numbers required. There are, however, large numbers of such men available from the ex-regulars and the released men of the last war, who could be recalled in an emergency.

## THE GENERAL RESERVE

There are a number of different classes of reserves, particularly officers, but as the officer classes correspond roughly to the three main classes of airmen reservists, a description of these only should be sufficient to give a picture of the remaining elements of the reserve, and will avoid repetition. The three principal airmen classes are:

*Class "E".* These are the ex-regular airmen with a reserve liability, and in quality are undoubtedly our most valuable reserve. At present, however, the numbers are comparatively small, but they will rise during the next few years, as a consequence of the short engagement scheme which was introduced a year or two ago.

*Class "G".* These are the men from the last war, and those who left the service prior to the coming into force on January 1, 1949, of the present National Service Act, which was due to expire on December 31, 1953, but which has now been extended for five years to the end of 1958. In numbers this is by far the largest element of our reserve forces and from it we should have to find the bulk of our skilled reservists in an emergency as there are about one million men in this Class, but in practice nothing like these numbers would be available, as many of the men are already too old for recall. The age of recall was fixed at forty-five under the defence legislation introduced this year, and at the same time the liability to recall was limited to an emergency. These men can no longer therefore be called up for annual training, as was done with some of them in 1951 and 1952.

*Class "H".* These are the National Service men doing their 3½ years' reserve service, and the strength builds up to a peak of about 120,000 in 1954. These men, however, only provide a reserve in the skilled and semi-skilled trades, as most of them cannot be trained to advanced trade standards during the two years of their call-up, if we are to get any worth while productive service out of them. In view of the importance of improving the standard of our reserves a scheme has now been introduced, however, under which advanced training will be given to a proportion of National Service men.

## TRAINING

As explained above, reserve aircrew are trained either in the auxiliary squadrons, where the aim is to keep them as nearly as possible at operational standard, or in the Reserve Flying Schools, where they are only kept in flying practice on light aircraft, so that the bulk of our aircrew reserve would require various periods of refresher training before they could take their place in operational squadrons.

The National Service man is liable for 60 days' training during his 3½ years' reserve service, but the Royal Air Force has not got the training capacity to absorb all the men available. These reservists have to be fitted into regular units, which themselves are mostly up to their peace time establishment, and it is therefore only possible to absorb men in limited numbers and in certain trades. It is also possible to call up additional men for training during the various air exercises, and every advantage is taken of these opportunities. Many men, however, may only be called up for one or two limited periods whilst in the reserve and others may even escape altogether.



A further difficulty is that National Service only provides a reserve of men in the less skilled trades. When men in the advanced trades were required "G" men were called up. Under the Reserve and Auxiliary Forces Act, 1951, power was given to call up "G" men for a "once and for all" period of refresher training of 15 days, and some 10,000 men were called up for this training during 1951 and 1952.

As already mentioned, however, an important alteration in the liabilities of "G" men was announced in the Statement on Defence, 1953, under which these men are no longer liable to be called up for refresher training, and their liability to recall in an emergency will cease at age of 45. At the same time the liability of the National Service man to be recalled in an emergency was extended for five years beyond the time when his two years with the colours and  $3\frac{1}{2}$  years part time service ends. Hitherto such men have had no recall liability after their part time service came to an end, and this will put the National Service man on par with the "G" man, although, like the latter, they will not be liable for recall for training during the five year period.

One important result of ceasing to call up "G" men for training, which will similarly affect the National Service men as they come to the end of their period of active reserve service in increasing numbers from the middle of 1954 onwards, is that these men, unless their civil occupation is similar to their Air Force trade, will gradually lose their skill of hand, and most of them would require some refresher training, if recalled in an emergency.

### ORGANISATION OF RESERVES

Apart from the Auxiliary Fighter Squadrons, the Fighter Control Units, and the Radar Reporting Units, the other types of auxiliary units, all the various categories of reservists, and the cadet forces, are controlled by Home Command of the Royal Air Force, which is organised in six Groups covering Great Britain and Northern Ireland, and whose areas correspond to those of the Army Commands.

The detailed administration of the reservists is undertaken by Reserve Centres, which are located at each Group Headquarters, and thus cover the country. Until recently there were 22 of these Centres, but following on the review of the policy for the ground element of the Volunteer Reserve, as a result of which training is no longer given at these Centres, the majority of them were closed down.

Consideration is at present being given to how the reserves could be more effectively organised, so as to ensure that in war units could be raised to their war establishments within the shortest possible time, and that the reservists will be fully trained. To this end a system of Reserve Flights on each operational station is proposed. Reservists of all categories other than auxiliaries would be allocated to these flights to fill the difference between the peace and war establishment, and those reservists liable for annual training would do it at the station where their Reserve Flight was located. On mobilisation the man would proceed direct to his war station, instead of going through a transit centre, with consequent delay and the disadvantage that the man might have no previous knowledge of the station to which he was eventually posted.

## CONCLUSION

In conclusion, the position in regard to reserves for the Royal Air Force can be summed up as being satisfactory as far as numbers are concerned, but the standard of training of many of the aircrew, senior N.C.O's., and advanced tradesmen is below that required, and many men would require refresher training of one kind or another before they could be usefully employed.

W. M. YOOL

# REFERENCE SECTION

## STATEMENT ON DEFENCE

(Cmd. 8768)

### I. INTRODUCTION

1. DURING THE past year Her Majesty's Government have devoted much time to a searching review of defence policy and of the rearmament programme which they inherited from their predecessors. The results, so far as they affect the situation in the financial year 1953-54, are set forth in this White Paper. The review is now being carried further forward with the object of formulating our defence policy in the longer term, given the probable international situation, the country's economic prospects, and the advent of new weapons and techniques. In the formulation of policy our obligations as a member of the North Atlantic Treaty Organisation and our position in the British Commonwealth and Empire will be fully taken into account.

2. Though it has been necessary in the face of economic circumstances to modify previous plans in the way described in later sections of this paper, there has been no change in the determination of the Government to put forth their utmost efforts to strengthen the defences of the United Kingdom, of the North Atlantic Treaty area with which those defences are indissolubly linked, and of the whole free world. Only if we are strong can we achieve our supreme object of preventing a third world war. If the risk of war has receded in past months, the cause has been the growing power of the Western nations, but there is still much to do before that strength will be sufficient, and the effort must continue.

3. The effort which we are making falls broadly into two parts, though these to a considerable extent overlap. First, there are our overseas obligations and our commitments in resisting the Communist campaign known as the cold war; and secondly, there are the preparations which we must make together with our Commonwealth partners and our allies against the risk that Communist policy, whether by accident or design, might force us to defend ourselves against a direct attack. Into the first part fall the forces which the United Kingdom maintains in overseas theatres and in particular our contribution to the forces of the United Nations in Korea and the struggle against organised banditry in Malaya. Into the second fall the re-equipment of the armed forces, the expansion of the Royal Air Force, and the building up of reserves of men and material. These preparations will put our forces in a better position to fight should global war come upon us, but they will also act as a powerful deterrent not only to open war, but also, by strengthening the confidence of the free world, to any extension of the cold war whether by the technique of vicarious aggression as seen in Korea or by subversion from within.

4. Our objectives have not changed; it is the means of achieving them and the rate at which we can progress towards their achievement to which

the Government have given such close attention since they assumed office. In times of stringency it is specially important to get the fullest possible value for our money; we must avoid committing ourselves too deeply to equipment which will have to be replaced at heavy cost within a relatively short space of time; and we must balance the need for greater defensive strength against the risk that by overstraining ourselves too greatly we shall by economic collapse give the Communists a bloodless victory. It is on such considerations that the policy embodied in the defence budget for 1953-54 has been founded.

5. The rearmament plan put in hand by the previous Government was to have cost £4,700 million, at the price level prevailing at the end of 1950, and was to have been completed by March, 1954. In fact, expenditure in the first year of the plan was about £120 million less than was envisaged originally. Although momentum was gathered in the second year of the plan, it was becoming clear when the present Government took office that the plan could not in any event be completed by March 1954. But it was also apparent that the momentum reached in the third year of the plan would have led to a rate of expenditure during that year which would have imposed too great a burden on the economy, particularly on the balance of payments, and to a still higher rate of expenditure in the following year. There was also good reason to doubt whether, even after the plan had been completed, the cost of maintaining the forces which would have by then been built up and of keeping them equipped with the most up-to-date material would have been within the country's resources.

6. For these reasons the Government concluded that rearmament would have to be spread over a longer period and held to a lower peak. The defence budget presented in the Statement on Defence 1952 (Cmd. 8475) was based on the hypothesis that the period within which the plan was to be completed would be extended by one year.

7. Further investigation showed that, even with this spreading forward, the load which the defence production programme would place upon industry was greater than was compatible with the increase in engineering exports to which it is necessary to look for a major contribution to the solution of the balance of payments problem. With the decline in export demand in recent months a large contribution from the engineering industries has become increasingly important and export demand is high in those sectors of the engineering industry on which the defence programme bears most heavily. It also appeared that if the programme were maintained in full during 1953-54, heavy expenditure would be incurred in some parts of the programme on the production of equipment which was not of the most advanced types. The Government therefore decided that in the interests of true economy as well as of the vitally needed increase in exports, any substantial rise above the high level of expenditure on defence production in 1952-53 was not possible. This decision was announced by the Prime Minister on December 4, 1952.

8. Notwithstanding the adjustments which have had to be made in order to maintain the strength of the economy, on which the defence programme must ultimately depend, a further very substantial contribution towards the modernisation, re-equipment, and expansion of the Services will be made in 1953-54. Expenditure will be at a level unknown before in peace-time and will increase further above the 1952-53 total.

## II. FINANCE

9. The total Defence Estimates for 1953-54 amount to £1,636·76 million. This compares with total estimated expenditure in 1952-53 of £1,513·5 million, including the Supplementary Estimates presented in January.

10. *Counterpart Funds*.—The figures in paragraph 9 above include provision for expenditure of £140 million of sterling counterpart of defence support aid, provided in dollars by the United States of America. This sterling counterpart, by agreement with the United States Government, is appropriated in aid of expenditure on the production of equipment for the Services. The Statement on Defence 1952 explained the nature of these counterpart funds and the reasons for appropriating them in aid of the defence budget. They do not reduce the level of the United Kingdom defence effort, which has been determined after taking account of the real relief to the United Kingdom economy afforded by the receipt of dollar aid from the United States.

11. As stated in paragraph 10 above, the sterling counterpart to be provided for as appropriations in aid of the Service Estimates 1953-54 amounts in all to £140 million. It has been allocated as follows: Navy £35 million, Army £55 million, Air £50 million. The counterpart is derived from two sources. First, there is the sterling counterpart (less the deduction of 10 per cent. which it has been agreed should be set aside for the use of the United States Government) arising out of defence support aid of \$358 million allotted to the United Kingdom for the United States fiscal year ending on June 30, 1953. The second element is the sterling counterpart (less a similar deduction) arising out of the dollars, amounting to about \$92 million, paid to the United Kingdom under the "Katz-Gaitskell" Agreement of July 7, 1950 (Cmd. 8020), as reimbursement of certain gold payments to the European Payments Union; these dollar receipts were in respect of the period up to June 30, 1952 and accrued in the United Kingdom financial years 1951-52 and 1952-53.

12. *Summary of Estimates 1953-54*.—The following tables compare the estimates for 1953-54 with the corresponding figures for 1952-53:

## NOT ALLOWING FOR COUNTERPART RECEIPTS

				£ million			
				Original Estimate, 1952-53	Supple- mentary Estimate, 1952-53	Total, 1952-53	Estimate, 1953-54
Admiralty	..	..	..	357·3	3·0	360·3	364·50
War Office	..	..	..	521·5	35·0	556·5	581·00
Air Ministry	..	..	..	467·6	Nil	467·6	548·00
Ministry of Supply	..	..	..	98·5	13·3	111·8	123·75
Ministry of Defence	..	..	..	17·3	Nil	17·3	19·51
				1,462·2	51·3	1,513·5	1,636·76

## ALLOWING FOR COUNTERPART RECEIPTS

				£ million			
				<i>Revised Estimate, 1952-53</i>	<i>Supple- mentary Estimate, 1952-53</i>	<i>Total, 1952-53</i>	<i>Estimate, 1953-54</i>
Admiralty	..	..	..	332.3	3.0	335.3	329.50
War office	..	..	..	491.5	35.0	526.5	526.00
Air Ministry	..	..	..	437.6	Nil	437.6	498.00
Ministry of Supply	..	..	..	98.5	13.3	111.8	123.75
Ministry of Defence	..	..	..	17.3	Nil	17.3	19.51
				1,377.2	51.3	1,428.5	1,496.76

13. A substantial part of the increase in defence estimates 1953-54 as compared with 1952-53 (not allowing for counterpart receipts) is accounted for by rises in costs. In addition, certain items of defence expenditure, e.g. telephone and telegraph charges and extra expenditure in Malaya, have been transferred to Service Votes from those of civil departments. A broad analysis of the defence budget 1953-54 under the usual headings is given in Annex II.

14. *Infrastructure*.—During 1952 the United Kingdom has agreed to contribute towards the cost of two more programmes of N.A.T.O. common infrastructure (that is the construction and development of various military works such as airfields, telecommunications, and headquarters) required, mainly on the Continent, for the common defence of the N.A.T.O. area. This brings the number of such programmes up to four. The first estimate of the cost of each of these programmes and the corresponding contributions which the United Kingdom has agreed to make are given in the table below:

	<i>Estimated Cost of Programme £ million</i>	<i>United Kingdom Contribution £ million</i>
Programme I (1950—Brussels Treaty) ...	33	9
Programme II (1951 N.A.T.O.) ...	79	14
Programme III (1952 N.A.T.O.) ...	152	20
Programme IV (1952 N.A.T.O.) ...	82	7

15. The cost-sharing agreement for Programme III which was negotiated in February, 1952 provided for the United Kingdom contribution to be furnished to the greatest possible extent in kind, that is in the form of equipment made in this country. The object of this was to reduce payments by the United Kingdom in foreign exchange. For various reasons it has not proved possible in practice to make a very substantial contribution in kind to the infrastructure work which is being carried out in other countries, and, with the agreement of the North Atlantic Council, arrangements are now being made to supply to the countries to which our contribution is due finished military equipment to the value of our outstanding obligations.

16. The Programme IV agreement was negotiated in December, 1952;

as for the first two programmes the United Kingdom contribution is to be made in cash.

17. The sum of £13.5 million which is included for infrastructure in the Ministry of Defence estimate for 1953-54 is the best estimate which can be made at present of the United Kingdom contribution to the cost of the work to be carried out during the financial year under all four programmes.

### III. MANPOWER

#### ACTIVE FORCES

18. *Regular Recruitment.*—The maintenance of effective and well-trained forces depends ultimately on adequate numbers of regulars serving on long-term engagements.

19. During 1952 regular recruiting to the active forces as a whole increased. The Navy has no short-term engagement. Recruiting on medium and long-term engagements continues to be satisfactory, though there are difficulties in certain categories; e.g. aircrew officers, seamen, and communications branches. The only long-term engagement now open in the Army is the new regular engagement for 22 years, with the opportunity to leave, if desired, at three-yearly intervals. This engagement was introduced in May 1952 and offers a long-service career often with prospects of employment up to the age of 55. It will, it is hoped, ultimately help to remedy the present serious shortage of experienced N.C.Os. and other ranks. Up to the end of 1952 about 5,400 men, excluding serving soldiers who changed to the new engagement, had undertaken it. Regular recruiting to the R.A.F. on long-term engagements in 1952 has been disappointing. Both the Army and R.A.F., however, have found that the short-term regular engagement of three years with the colours followed by a period of reserve service (introduced by the R.A.F. in February, 1950 and by the Army in November, 1951) has produced very good results. Up to the end of 1952 about 57,500 men had joined the R.A.F. and about 43,000 the Army on this type of engagement. The contribution which this engagement can make to meeting the Services' regular recruiting requirements will depend on the numbers who decide to prolong their service with the colours beyond the initial three-year period.

20. The numbers of men and boys recruited on regular engagements in the four years 1949-52 and the estimated number of regular recruits in 1953 are as follows:

				<i>Actual</i>		<i>Estimate</i>	
				1949	1950	1951	1952
							1953
Navy	..	..	..	16,300	10,000	10,500	10,300
Army	..	..	..	23,800	25,300	26,400	53,200
R.A.F.	..	..	..	12,200	23,600	44,900	39,800
Total	..	..	..	52,300	58,900	81,800	103,300
							100,300

21. *Extensions and Re-engagements.*—In the Army and R.A.F. the improvement in extensions of service and re-engagements noted in 1951 was unfortunately not fully maintained in 1952, despite the continuation

of the special financial inducements introduced in September 1950 (Cmd. 8027). In the Navy the improvement is being maintained although the position in certain branches is not yet satisfactory. The inducements to re-engage will continue in 1953. Many more extensions and re-engagements are needed if the Services are to maintain their efficiency and to make good the present serious shortage of senior N.C.Os. and technicians required to handle and maintain the complex equipment with which the forces are now being supplied.

22. *Retained Regulars and Recalled Reservists.*—After the outbreak of war in Korea all three Services retained regulars with the colours beyond their normal terms of service, and the Navy and Army also recalled some reservists. In accordance with the plans announced in the Statement on Defence, 1952, the last of the regulars retained by the Army and R.A.F. will be released by September, 1953. In the Navy the period of retention will be gradually reduced and all retained men will be released by early 1954. All reservists recalled to the Army had been released by March 1, 1952. The Navy have now recalled the last of the Royal Fleet Reservists required for service with the Fleet and all will be released by early 1954.

23. *Maintenance of Regular Strengths.*—Allowing for the factors mentioned in paragraph 22, and for the general trends in recruitment, extensions, and re-engagements described in paragraphs 19 to 21, the total numbers of regulars in the active forces are expected to increase during the year. The estimated strengths at April, 1953, and April, 1954, are compared in the following table with the actual strengths at April, 1951, and April, 1952:

## REGULAR MALE STRENGTH

(Thousands)

				<i>Actual</i>		<i>Estimate</i>	
				<i>April 1,</i>	<i>April 1,</i>	<i>April 1,</i>	<i>April 1,</i>
				<i>1951</i>	<i>1952</i>	<i>1953</i>	<i>1954</i>
Navy .. ..	..	..	..	125·6	135·5	134·4	123·5
Army .. ..	..	..	..	202·2	214·8	218·0	231·0
R.A.F. .. ..	..	..	..	139·4	171·5	189·3	198·0
Total .. ..				467·2	521·8	541·7	552·5

24. *National Service Requirements.*—Because there were five registrations, the number of men available in 1952–53 for national service call-up—237,000—was larger than normal. In 1953–54 it is proposed to revert to four registrations and the number of men estimated to be available for call-up is 206,000. Allocation to the Services will be as follows:

Navy	..	..	..	..	7,500
Army	..	..	..	..	129,500
R.A.F.	..	..	..	..	65,400

25. This allocation, which includes those who are expected to volunteer for regular engagements, leaves a small margin of about 4,000 which will serve as a reserve against changes in requirements and help to ensure that the call-up is evenly spread over the year.



26. *Size of Active Forces.*—The total strength of the active forces in April, 1953, and April, 1954, will, it is estimated, be as follows: the figures for April, 1952, have been added for comparison:

TOTAL ACTIVE STRENGTH				(Thousands)		
				<i>Actual</i>	<i>Estimate</i>	
				<i>April 1,</i>	<i>April 1,</i>	<i>April 1,</i>
				<i>1952</i>	<i>1953</i>	<i>1954</i>
Regulars	..	..	..	521·8	541·7	552·5
National Service	..	..	..	317·7	313·6	287·7
Women	..	..	..	23·2	24·5	26·2
Total	..	..	..	862·7	879·8	866·4

27. Within these totals (as shown in the detailed analysis at Table 1 of Annex 1) the strength of the Army will remain constant during 1953–54, while that of the Navy and R.A.F. will decline by about 10,000 and 3,500 respectively. In the Navy the reduction in strength is due to the termination of measures for the compulsory retention of regulars and the recall of reservists. The reduction in the size of the R.A.F. arises mainly from the smaller training organisation required to support the reduced rate of front-line expansion now contemplated.

28. *Civilian Manpower.*—The figures given in paragraph 26 do not include civilians directly employed by the defence departments. There will be some increase in 1953–54 in the numbers of civilians employed by the War Office, but the numbers employed by the Admiralty, Air Ministry, and Ministry of Supply will remain about the same as in 1952–53.

#### RESERVE AND AUXILIARY FORCES

29. *Increases in Strength.*—The size of the reserve and auxiliary forces increased from 273,000 at the beginning of 1952 to about 427,000 by January 1, 1953. This has been due to the entry into the reserves of national service men on completion of their full-time service. The number of national service men in the reserve and auxiliary forces increased from 152,000 at January 1, 1952, to about 307,000 at the beginning of 1953. These figures are analysed in Table 2 of Annex I.

30. There has been a small but steady improvement in the numbers of volunteers in the Navy and Air Force reserve forces. In the Army there has been a welcome increase of about 50 per cent. in the Army Emergency Reserve, but the Territorial Army has lost a large number of men, mainly those who enrolled when the force was reconstituted six years ago.

31. It is therefore of the greatest importance that as many national service reservists as possible should undertake voluntary engagements with the reserve and auxiliary forces in place of their statutory liability for part-time national service. Progress in the Navy and Air Force continues to be slow; but in the Army it has shown a marked improvement, particularly in the Territorial Army, where 29 per cent. of the national service men who had passed into the Territorial Army by the beginning of 1953 had taken on voluntary engagements.

## FUTURE OF NATIONAL SERVICE

32. Under the provisions of the National Service Act, 1948, there is no power to call up men who reach the age of 18 after December 31, 1953, unless a later date is, with Parliamentary approval, substituted by Order in Council. Unless the call-up is extended to include persons attaining the age of 18 after the end of 1953 the national service component of the active forces will then begin rapidly to decline and there is no prospect of making good the shortage from any other source. In addition, if the present scheme is not continued beyond December, 1953, the national service reserve will begin to decline from the end of 1955 and will virtually have ceased to exist by mid-1959, when the last of the men called up before the end of 1953 will have discharged their liability for 2 years' whole-time and 3½ years' part-time service.

33. The Government are satisfied that, having regard to the present international situation, it would be impossible to allow a depletion of the armed forces and their reserves to the extent that would occur if the power to call men up for national service on reaching the age of 18 were to be allowed to lapse at the end of 1953. The position will be kept under review in the light of developing circumstances, but the power to call up must be retained beyond the end of 1953, on the understanding that it will be exercised in such a way as to restrict the burden to the minimum that safety demands. The Government also consider that the present period of 24 months' whole-time service, which was introduced following the outbreak of hostilities in Korea, must continue so long as the international and overseas situation imposes its present demands upon us. The possibility of shortening this period, should the situation permit, will be reviewed from time to time.

34. The Government will accordingly, in due course, propose to Parliament that the present national service scheme should be extended for a further five years.

35. Under existing legislation national service men, on completion of their 2 years with the colours and 3½ years' part-time service in the reserves, are free from all further reserve liability though they are still only in the middle or late twenties. By about mid-1954, the number of men in the national service reserve is expected to be between 400,000 and 500,000; even so, and allowing for regular and volunteer reservists, the Services would still need to recall large numbers of Class Z and G reservists in the early stages of an emergency. The military value of the Class Z and G reserves will inevitably decline as the men grow older and their experience becomes more out of date.

36. A situation in which young ex-national service reservists called up since 1949 would, in increasing numbers from the middle of 1954, have no liability for recall to the colours at the beginning of an emergency, while older Class Z and G reservists continued to be liable to such recall, could not be defended either on military grounds or as a matter of equity.

37. The Government therefore consider that national service men called up for whole-time service during the period of five years beginning January 1, 1949, and ending December 31, 1953, should, after completing their terms of whole-time and part-time service under the 1948 Act, remain registered for a further period of five years as liable to recall in a military

emergency. It is not intended to call them up for part-time or annual training during this period. Proposals to this effect will be made to Parliament in due course.

#### CLASS Z AND G RESERVISTS

38. There is also a need to clarify the position of Class Z and G reservists in regard both to their liability to be called up for annual refresher training and to the age beyond which they will no longer be regarded as liable to recall in the first stages of a military emergency. During the past two years about 330,000 Class Z reservists have been given 15 days' refresher training with the Army and about 11,000 Class G reservists with the R.A.F. Now that the reserve and auxiliary forces are steadily filling up with national service reservists the annual call-up for training of Class Z and G reservists will be discontinued.

39. It is therefore intended to provide, in the proposed legislation extending the reserve liability of national service men, that the liability of Class Z and G reservists will be limited to recall in a military emergency and will cease when they have reached their 45th birthday.

#### HOME DEFENCE MEASURES

40. Our overseas defence commitments oblige us to station abroad a much greater proportion of the regular formations of the Army than ever before in peace-time. In order partly to redress the balance seven new battalions have been formed since the beginning of 1952. This has been achieved by the most rigorous economies in manpower throughout the Army, the effective strength of which had by the end of the year been increased to the equivalent of  $11\frac{1}{2}$  divisions. Other steps have also been taken to strengthen the defences of this country, not only as a deterrent but also to ensure that strong and effective resistance could be offered to sudden invasion. These include:

- (i) *Organisation and Training of Mobile Columns*.—Service schools, training units, depots and other static establishments have been organised for local defence purposes and given combat training. Wherever practicable mobile columns are formed from these units, often in conjunction with a fighting formation stationed nearby, with a defence role covering a wide area. These columns are supplementary to the Home Guard.
- (ii) *Reorganisation and Training of the Home Guard*.—Recruitment and registration for the Home Guard has continued steadily, along with the operational training of the effective battalions which under the original scheme were authorised to enrol personnel up to a peace-time establishment of 900 men. The number enrolled in the Home Guard is over 26,000. In addition there are over 21,000 officers and men on the reserve roll for enrolment in an emergency. In the light of experience, the peace-time establishment of effective battalions was reduced, at the end of 1952, to 300. At the same time, that of the cadre battalions was raised to 100 in order to create a larger nucleus on which to expand in war and to allow of more realistic training.

- (iii) *Development of the Royal Naval Minewatching Service and Royal Observer Corps.*—Recruitment and training are proceeding in these two organisations which in an emergency would have a vital part to play in keeping open the approaches to our ports and in the air defence of the United Kingdom. The number enrolled in the Royal Naval Minewatching Service is about 2,800 and in the Royal Observer Corps about 18,000.

#### CONDITIONS OF SERVICE

41. The continued tension in international relations, hostilities in Korea, cold war conditions in Europe, anti-bandit operations in Malaya and unrest in Kenya, all add to the difficulties of the Services, particularly in overseas theatres. This is especially so in the Army. Nearly all combatant units of the Regular Army are serving overseas and two-thirds of the married personnel in the Army are now separated from their families. In the face of these difficulties the Services continue to do all they can to ensure that the living and working conditions of the armed forces compare as well as possible with those in civil life.

42. *Accommodation.*—Further progress has been made with the provision of married quarters in the United Kingdom. It is expected that 5,500 quarters will be completed during the current financial year, making a total of nearly 13,000 since the coming into force of the Armed Forces (Housing Loans) Act, 1949. Considerable further arrears of housing remain to be made good, however, and Parliament will be asked, in due course, to extend the provisions of the Act. It is expected that over 4,000 will be started in 1953–54.

43. *Forces Family Pensions.*—Improvements in the scheme of pensions for widows and dependent children of officers and the extension of the scheme to long-service other ranks in the Services were announced to Parliament on December 16, 1952. Full details of the new rates and of the improved conditions governing their award have been published in Cmd. 8741 of January 20, 1953.

44. *Resettlement.*—Satisfactory progress continues to be made, in accordance with the advice given by the Advisory Council on the Relationship between Employment in the Forces and Civilian Life, in the resettlement of ex-regulars. Both sides of industry have co-operated generously in helping the ex-regular to move smoothly from Service to civilian employment; the skilled ex-regular and (with certain opportunities available for vocational training) the unskilled man, too, normally meet little difficulty in making this move.

45. Few ex-regulars are registered as unemployed and in need of resettlement, and almost all of these have been unemployed for less than six weeks. Unemployment is heavier among ex-officers, particularly the older men. This is part of a general problem; the older officer, like the civilian of similar age, often has difficulty in finding employment suited to his qualities and experience.

46. The Ministry of Labour has made special arrangements to encourage and facilitate the employment of older men and women, including an Advisory Committee appointed by the Minister which represents employers and employees in industry, commerce and the professions

and the other main interests concerned. The work of this Advisory Committee will, it is hoped, be of increasing value to long service regulars.

#### IV. PRODUCTION, RESEARCH AND DEVELOPMENT

47. In his statement on the defence production programme on December 4, 1952, the Prime Minister said that, if the three-year rearmament programme drawn up by the late Government had been carried through in full, expenditure on production in 1953-54 would have been over £850 million. The effect of the decisions which have now been taken will be that expenditure on production in 1953-54 will be about £650 million.

48. So far as possible the curtailment of earlier production plans will be brought about by spreading deliveries of equipment over a longer period. But it is the policy of the Government to accelerate the production of the most advanced types of equipment, although, in view of the progress which has taken place in the development of the medium bomber, earlier plans for re-equipment of the Royal Air Force with light bombers are being reduced to some extent. The spreading forward of deliveries of other types of equipment will be so designed as to impose the longest delays where the need of the Services is less urgent or production could be rapidly increased in emergency.

49. The application of super-priority to certain vital types of equipment has been of great benefit in ensuring the prompt and adequate supply of materials and semi-fabricated parts. The system has recently been extended to cover two new types of medium bomber, as well as certain civil aircraft.

50. Some of the capacity which is being or has been released by modifications in the defence production programme will be employed on the manufacture of war material for export to the Commonwealth, our allies in the North Atlantic Treaty Organisation, and other friendly countries. A particularly important form of export is what is known as off-shore procurement by the United States Government. Up to February 1, 1953, the United States had placed off-shore orders in this country for equipment and supplies for their own forces and for transfer to other N.A.T.O. countries to the value of \$167 million. The largest individual order so far placed is one for Centurion tanks worth \$89 million. Discussions are continuing with the United States authorities about the placing of further orders of this sort in the United Kingdom. Apart from the help these orders give in relieving our dollar shortage and in building up the strength of N.A.T.O., they also help to strengthen the war potential of the United Kingdom by keeping our defence production capacity in being.

51. *Labour*.—Many firms and Government establishments have found difficulty in the past year in obtaining enough skilled workers for defence production, though they have been able to recruit enough unskilled workers. The operation of the Notification of Vacancies Order has helped to provide the labour required, while schemes of upgrading and training in industry have mitigated the shortage of skilled workers. The changes which have been made in the defence programme will not result in redundancies on any considerable scale, but many firms which would have needed to recruit large numbers of additional workers, including much

skilled labour, will no longer have to do so. In the aircraft industry the labour force has expanded in 1952 as expected; the numbers have grown from 177,000 to 206,000 and more workers will be required for super-priority aircraft as production expands. In the private shipyards the number of workers employed on naval new construction has grown during the last two years from about 10,000 to 16,000. In all, the total labour force engaged on production for the Services and on research and development in 1953 will be about 850,000.

52. *Machine Tools*.—Delivery of machine tools has continued to be satisfactory. Of the 35,000 extra machine tools required, about 18,000 were ordered from Europe and the United States in order to supplement home supplies. 13,000 of these had been delivered by the end of 1952.

53. *Raw Materials*.—There has been a marked improvement in supplies of raw materials, and defence production is unlikely to be substantially delayed by shortages of materials. The steel allocation system has, on the whole, ensured that defence requirements of steel have been met, apart from a few difficulties arising from shortages of particular types and specifications; for example, the naval programme of submarines and frigates has been retarded by the lack of special steel plates and sections. The super-priority scheme has ensured an adequate supply of other materials. It has been possible to lift the restrictions on the use of most non-ferrous metals which had been imposed in the interests of defence and other essential needs. The improvement in supplies of many raw materials has also enabled more rapid progress to be made by the Ministry of Materials with the acquisition of strategic reserves than was expected a year ago. A supplementary sum of about £20 million has been voted for the purpose during the current financial year. It has been necessary to restrict purchases of some materials to ease the strain on our gold and dollar resources, but despite the need to continue with these restrictions it is expected that further progress will be made in 1953–54.

#### MAIN FEATURES OF THE 1953–54 PRODUCTION PROGRAMME

54. *Navy*.—The emphasis in the Naval New Construction programme, as in 1952–53, will be on the building of ships for minesweeping and anti-submarine duties; on the progress and completion of aircraft carriers; and the provision of some modern aircraft for operation from them and for shore training. It is expected that about 70 coastal and inshore minesweepers will be completed during the financial year.

55. The emphasis of the modernisation and conversion programme is on the conversion of destroyers to anti-submarine frigates. Work on the modernisation of H.M.S. *Victorious* will continue. The Royal Dockyards will be fully occupied during the year on the programme of repairs, refits, modernisations and conversions, and a good deal of this work will also be carried out by contract.

56. As the main programmes of construction, modernisation, and conversion are now getting into their stride and as further deferments would directly affect the front-line strength of the Fleet, it is preferable to interfere with these to the minimum extent possible. In order to carry out this work within the resources available, the provision made for

ammunition, oil fuel and stores must be on a reduced scale involving some drawing upon existing stocks.

57. *Army*.—Increased provision has been made in the War Office production programme in 1953–54 for ammunition. This is due to higher production of ammunition for new weapons and to a considerable increase in the cost of complex modern types of shells, rockets, etc.

58. The production of new types of armoured vehicle (including the new scout car and armoured personnel carrier) together with complementary equipments such as recovery vehicles and bridge-layers will continue in 1953–54. The modern tanks designed and brought into service in recent years (Centurion Mk. III) have already been delivered in numbers sufficient for the active Army, and production is continuing to meet the balance of requirements.

59. The production of unarmoured vehicles will be concentrated on new types specially developed in recent years. Many of these types will come into service for the first time.

60. During 1953–54 a substantial number of light anti-aircraft guns will be modernised. There will also be some production of the new infantry anti-tank heavy weapons and of the machine carbine to replace the Sten.

61. In adjusting the Army production programme to take account of the limitations on defence expenditure in 1952–54 care has been taken to avoid as far as possible cuts in weapons and other warlike stores, although purchases of non-warlike stores will be reduced. The rate of stockbuilding to meet mobilisation requirements and war reserves has also been reduced.

62. *R.A.F.*—Aircraft is by far the largest item, accounting for a little over half of the total production programme. The aircraft programme carries out the aim of concentrating effort upon more modern and advanced types and curtailing the production of some of the current types.

63. Aircraft gun ammunition and bombs are the main items in the explosives programme in 1953–54. Under the radio and radar programme the expansion and modernisation of the radar network in the United Kingdom and overseas will continue and mobile signals facilities will be provided.

64. *Military Air from the United States and Canada*.—The Statement on Defence 1952 gave some details of military equipment which had been earmarked for delivery to the United Kingdom from the United States under the Mutual Security Act for the purpose of improving the effectiveness of our N.A.T.O. forces. During the past year deliveries have increased in volume. The largest single category has been spare parts for the maintenance of equipment already held by our forces, but in addition complete equipments received have included bomber and anti-submarine aircraft, rocket launchers and rockets, electronic and engineering equipment, and specialist vehicles.

65. In October, the United States Government generously agreed that we could divert temporarily to Malaya ten helicopters which had been destined for our N.A.T.O. force. These are now in use in Malaya.

66. Deliveries of equipment are expected to increase in the coming year. Meanwhile discussions are proceeding on further allocations of United States equipment and also on the supply of British equipment financed by the United States under the off-shore procurement programme.

67. The delivery of F.86 (Sabre) jet aircraft to the Royal Air Force has begun and will continue throughout the year. Canada is producing and paying for the airframes, and the engines and equipment are being supplied by the United States under the Mutual Security programme. Canada is also providing from her own resources other items of military equipment including anti-aircraft radar and ammunition.

#### RESEARCH AND DEVELOPMENT

68. Large sums of money have been and must continue to be invested in defence research and development, the increasing cost of which, as projects initiated since the war proceed from the research to the design and development stage, is the main reason for the rise in Ministry of Supply expenditure on defence account. Expenditure on research and development in 1953-54 will be well over £100 million—about 40 per cent. more than in 1951-52. The more expensive elements in the programme are guided weapons, air frames and aero-engines, and electronics. The cost of atomic energy research is not included in the defence budget.

69. Although much of our development work must remain secret, some important results have been made public during the year. The first British atomic weapon has been exploded in the Monte Bello Islands. Work on guided weapons for both the defensive and offensive roles has been intensified and encouraging progress has been achieved. Information has been released about advanced and extremely efficient anti-submarine equipment for frigates, about the steam catapult to enable heavy aircraft to be launched from carriers, and, more recently, about the Navy's first operational craft with gas turbine engines, the *Bold Pioneer*. Among the many outstanding aircraft prototypes which have been made known are the two new medium bombers (the Avro Vulcan and the Handley Page Victor); the delta wing all-weather fighter (the Gloster Javelin); and among interceptor fighters the Supermarine Swift has been joined by the Hawker Hunter. Among aircraft engines, substantial progress has been made with the Rolls-Royce Conway engine, which embodies the by-pass principle. The fire power of the Army will be increased by new weapons and improved designs of ammunition. The new range of engines for military vehicles has demonstrated outstanding reliability and long life.

70. Most of these and other successful developments are the fruit of collaboration between Government establishments and industrial organisations. They provide evidence of the high quality of the work of the scientists, engineers and designers who are engaged, both in Government service and in industry, on the evolution of improved weapons and equipment for the armed forces.

71. While the research and development programme must inevitably bear some share of financial restriction it will continue to be accorded a very high priority.

#### V. WORKS SERVICES

72. Expenditure on works services has been closely examined and some reductions have been made where they can be carried out with least effect on fighting strength. Defence building in the United Kingdom is also, in



company with civil building, subject to some restrictions through shortage of building resources.

71. The adjustments to the defence programme described in Section 1 have not radically changed building requirements. The main features of the programme continue to be the provision of new and the modernisation of existing airfields, covered storage, the air defence system, and work at research and development establishments. Minor works services and maintenance of existing buildings, many of them very old, have also to be undertaken. Only very small provision can be made for new permanent barrack accommodation.

74. In the past two years there has been a very steep rise in expenditure on defence works. In 1953-54, however, expenditure is estimated to be £171 million as compared with a provision of £168 million in 1952-53.

75. The programme of works services undertaken by the Air Ministry on behalf of the United States Air Force stationed in this country will increase during 1953. The United States Government will continue to make a substantial financial contribution.

## **VI. CO-OPERATION WITHIN THE COMMONWEALTH AND WITH THE NORTH ATLANTIC TREATY ORGANISATION**

76. The defence policy of the United Kingdom continues to be based on the closest possible co-operation with her partners in the Commonwealth and in N.A.T.O.

### **COMMONWEALTH**

77. The achievements of the First (Commonwealth) Division and of the Commonwealth naval and air forces in Korea form an outstanding example of Commonwealth co-operation in defence. The Division includes units from the United Kingdom, Canada, Australia, New Zealand, with an ambulance unit from India. United Kingdom, Canadian, Australian, and New Zealand naval forces continue to work closely together under the United Nations Command and air force units from the United Kingdom, Australia, and South Africa are operating in Korea. All these units have won the highest praise for their efficiency and determination.

78. In the struggle against the Communists in Malaya there are engaged, in addition to Malayan, United Kingdom, and Gurkha troops, men from New Zealand, Southern Rhodesia, Kenya and Nyasaland, Fiji and Sarawak and an Australian air unit is working with the R.A.F. In the Middle East, Australian and New Zealand air units are serving alongside United Kingdom forces.

79. There is close co-operation between the United Kingdom, Australia and New Zealand in defence planning for the Far East. The Governments of Australia, New Zealand, and South Africa have expressed their willingness to join with other interested Governments in setting up an Allied organisation for Middle East defence.

80. The United Kingdom and the other Commonwealth countries continue to work closely together in all aspects of defence. The exchange of men between the United Kingdom and the other countries ensures that experience and technical knowledge are shared between all the Services. Pilots and navigators for the Royal Air Force and observers for the Royal Navy are being trained in Canada. There is also a constant interchange

of defence research information and personnel. The base at Woomera in Central Australia is the main Commonwealth centre for trials of super-sonic guided weapons. The recent test of an atomic weapon at Monte Bello was carried out in close collaboration with the Australian Government. A meeting of the Commonwealth Advisory Committee on Defence Science is to be held in New Delhi at the beginning of March.

#### DEVELOPMENT OF THE NORTH ATLANTIC TREATY ORGANISATION

81. The N.A.T.O. Ministers at their Lisbon meeting in February, 1952, decided to establish a Council of Permanent Representatives in Paris as a body with effective powers of decision. This Council, meeting normally under the chairmanship of the Secretary-General, the Rt. Hon. Lord Ismay, and with the assistance of an international staff, have assumed day-to-day responsibility for the tasks undertaken previously by the Council Deputies, the Defence Production Board and the Financial and Economic Board. In addition, the Council has become responsible for the Annual Review of the N.A.T.O. defence effort which was initiated in 1951 by the Temporary Council Committee and to which reference was made in the Statement on Defence 1952 and in the White Paper on the North Atlantic Council meeting in Paris in December, 1952 (Cmd. 8732).

82. Close liaison is maintained with the permanent military bodies of N.A.T.O. in Washington—the Standing Group and the Military Representatives Committee—through a Standing Group Liaison Officer in Paris. The military structure of N.A.T.O. is shown in the diagram at Annex III.

83. The N.A.T.O. command structure in Europe has now been completed. A South-Eastern Europe Land Forces H.Q. has been set up under the Commander-in-Chief, Southern Europe, to be responsible for the defence of Greece and Turkey. There has also been established, under the Supreme Allied Commander, Europe, a unified N.A.T.O. command in the Mediterranean under a British Admiral (Cmd. 8732). The Supreme Command in the Atlantic was established in April, 1952. At the same time, the British Commander-in-Chief, Eastern Atlantic, and the British Air Commander-in-Chief, Eastern Atlantic, assumed their duties as Allied Commanders under the Supreme Commander (SACLANT).

84. Important exercises have been carried out in Europe and in the Atlantic and the Mediterranean, in which our forces have taken part under N.A.T.O. commanders.

85. The United Kingdom is co-operating with her N.A.T.O. partners in joint defence and production planning, and in studies aimed at achieving an increased measure of standardisation in their armaments. The undertakings relating to the size of land, sea, and air forces to be placed at the disposal of N.A.T.O. during 1952, given at Lisbon in February, 1952, have been broadly fulfilled. There are at present four British divisions stationed in Germany.

#### EUROPEAN DEFENCE COMMUNITY

86. The Treaty establishing the European Defence Community (E.D.C.) was signed on May 27, 1952, by France, Belgium, the German Federal Republic, Italy, Luxembourg, and the Netherlands, but it is still

awaiting ratification. The United Kingdom has explained her inability to become a member of the Community, but has shown her readiness to collaborate with it by signing an agreement establishing mutual security guarantees between the members of the Community and herself and by joining with the United States and France in a declaration of her abiding interest in the strength and integrity of the Community. The United Kingdom has also advised the E.D.C. Interim Committee that the British forces on the Continent would collaborate closely with those of the Community and could be associated with them in matters of training, administration, and supply. United Kingdom observers are participating in the military planning preparatory to the establishment of the European Defence Forces.

#### VII. CIVIL DEFENCE

87. Civil Defence, although it is not concerned with the cold war, forms an essential part of our defence planning. As with the rest of the defence effort, civil defence too is affected by the economic considerations mentioned in the introduction to this Statement. It is not possible to maintain in peace the large whole-time services which would be required in war for rescue, ambulance, and other civil defence work and for augmentation of the fire service, but the possibility of forming a reserve for these services of men trained in peace-time is under consideration. Further progress has been made in 1952 with the recruitment and training of part-time volunteers for part-time service in war with the civil defence services (including the police, fire, and health services). Nearly half the peace-time strength of these volunteer services has now been enrolled, though the incidence of recruitment over the country is not altogether satisfactory and has lagged in the fire and rescue services. A promising start has been made with a parallel Industrial Civil Defence Service. In addition, with the assistance of personnel lent by the armed forces, an experimental civil defence mobile column has been started which will carry out exercises in 1953 to set the pattern for the large number of whole-time mobile forces that would be required in war. Economic conditions preclude us from devoting any large part of our resources to the many physical preparations necessary for full civil defence, but planning for these measures has continued to make progress, and a beginning has been made with some important projects of particular significance in relation to the total defences of the country. The process of building up stores and equipment for civil defence also continues. This policy will be maintained during 1953.



## ANNEX I

TABLE 2.—ANALYSIS OF VOLUNTEER RESERVE AND AUXILIARY FORCES AND NATIONAL SERVICE RESERVE

	Strength at January 1, 1952			Strength at January 1, 1953		
	N.S.		Total	N.S.		Total
	Normal volunteers	Part-time		Normal volunteers	Part-time	
<i>Royal Navy</i>						
Royal Naval Reserve .. ..	3,062	—	3,062	3,456	—	3,456
Royal Naval Volunteer Reserve .. ..	7,964	323	8,392	8,773	151	9,528
Royal Marine Forces Volunteer Reserve .. ..	831	47	878	1,001	69	1,070
Royal Naval Special Reserve .. ..	—	—	7,283	—	7,946	7,946
Women's Royal Naval Reserve .. ..	—	—	—	920	—	920
<i>Army</i>						
Territorial Army .. ..	72,796	17,465	142,233	67,351	93,770	198,785
Army Emergency Reserve .. ..	5,966	173	41,859	8,947	81,921	91,809
Queen Alexandra's Royal Army Nursing Corps (T.A.) .. ..	121	—	121	174	—	174
Women's Royal Army Corps (T.A.) .. ..	10,658	—	10,658	9,730	—	9,730
<i>Royal Air Force</i>						
Royal Auxiliary Air Force .. ..	5,506	330	5,836	5,899	584	6,483
Women's Royal Auxiliary Air Force .. ..	2,617	—	2,617	2,610	—	2,610
Royal Air Force Volunteer Reserve .. ..	10,922	445	11,367	11,142	768	11,910
Women's Royal Air Force Volunteer Reserve .. ..	738	—	738	693	—	693
Royal Air Force Reserve of Officers (N.S.) and Class H of the Air Force Reserve .. ..	—	—	38,632	—	82,178	82,178

# **DIVISION OF THE DEFENCE BUDGET UNDER THE PRINCIPAL HEADINGS**

(£ million)

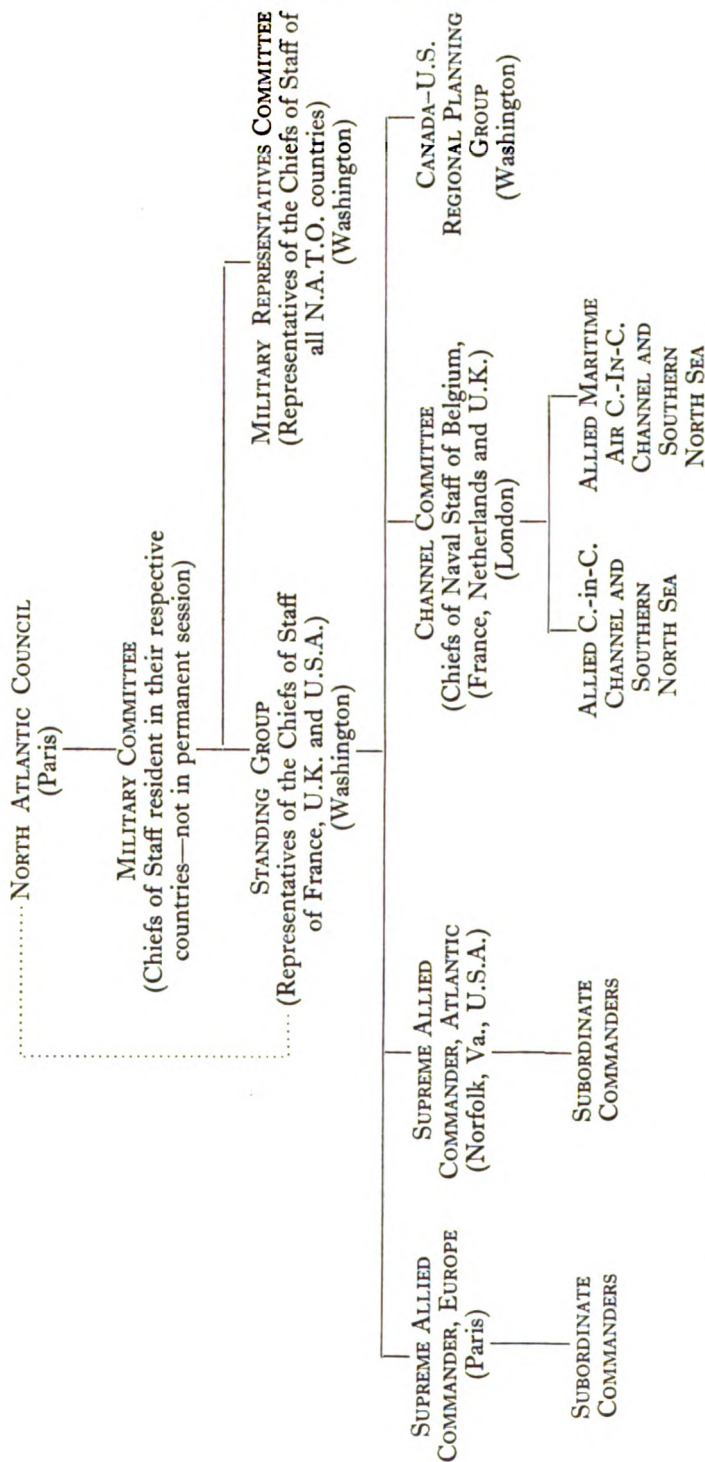
1	2			3			4			5			6			7		
	Admiralty			War Office			Air Ministry			Ministry of Supply			Ministry of Defence			Totals		
	Gross	A. in A.	Net	Gross	A. in A.	Net	Gross	A. in A.	Net	Gross	A. in A.	Net	Gross	A. in A.	Net	Gross	A. in A.	Net
1. Pay, etc., of Service Personnel	52.59	0.51	52.08	139.39	13.10	126.29	88.19	2.62	85.57	2.50	—	2.50	2.81	—	2.81	285.48	16.23	269.25
2. Pay, etc., of Reserve, Territorial and Auxiliary Forces, and grants for administration, etc.	1.53 43.12	— 1.08	1.53 42.04	14.62 64.35	0.18 1.24	14.44 63.11	1.69 33.58	— 2.67	1.69 30.91	— 11.65	— —	— —	— —	— —	— —	17.84 153.34	0.18 4.99	17.66 148.35
3. Pay, etc., of Civilians	8.94	0.19	8.75	35.42	0.35	35.07	13.70	1.00	12.70	—	—	—	—	—	—	58.32	1.54	56.78
4. Movements																		
5. Supplies—																		
(a) Petrol, oil and lubricants	19.46	8.16	11.30	12.57	2.83	9.74	70.00	4.25	65.75	1.40	—	1.40	0.01	—	0.01	103.44	15.24	88.20
(b) Fuel and ration allowance	13.06	2.73	10.33	46.89	9.83	37.06	20.10	1.06	19.04	—	—	—	—	—	—	80.05	13.62	66.43
(c) Food and light	4.26	0.02	4.24	6.20	1.43	4.77	6.52	1.90	4.62	1.10	—	1.10	—	—	—	18.08	3.35	14.73
(d) Miscellaneous	0.71	0.69	0.02	2.21	0.17	2.04	1.27	0.20	1.07	—	—	—	0.14	—	0.14	4.33	1.06	3.27
6. Production and Research	37.49	11.60	25.89	67.87	14.26	53.61	97.89	7.41	90.48	2.50	—	2.50	0.15	—	0.15	205.90	33.27	172.63
Production and research, providing for the appropriation-in-aid of counterpart fund†	214.08	21.51	192.57	244.00	13.50	230.50	266.25	21.00	245.25	638.00	560.60	77.40	—	—	—	845.63*	99.91*	745.72
7. Works—	214.08	56.51	157.57	244.00	68.50	175.50	266.23	71.00	193.23	638.00	560.60	77.40	—	—	—	345.63*	239.91*	605.72
(a) Works	22.44	0.90	21.54	35.37	4.16	35.76	82.53	16.08	69.56	29.70	—	29.70	13.55	0.10	13.45	183.59	21.75	170.12
(b) Rents	0.59	0.51	0.08	4.55	—	—	3.11	—	—	—	—	—	0.03	—	0.00	8.28	6.97	—
(c) Loan quarters	1.47	—	—	5.50	—	—	—	—	—	—	—	—	—	—	—	6.97	—	—
(d) Repayment of sums issued under the Armed Forces (Housing Loans) Act, 1949	0.06	—	0.06	0.49	—	0.49	0.44	—	0.44	—	—	—	—	—	—	0.99	—	0.99
8. Miscellaneous effective service	24.56	2.88	21.68	45.91	9.66	36.25	86.08	16.08	70.00	29.70	—	29.70	13.58	0.10	13.48	199.83	28.72	171.11
9. Non-effective charges	5.39	2.03	3.36	7.08	3.26	3.82	8.89	2.08	6.81	—	—	—	2.22	0.05	2.17	23.58	7.42	16.16
10. Trials before appropriation-in-aid of counterpart funds	16.80	0.20	16.60	18.13	0.22	17.91	4.85	0.26	4.59	—	—	—	—	—	—	39.78	0.68	39.10
11. Totals providing for the appropriation-in-aid of counterpart funds	404.50	40.00	364.50	636.77	55.77	581.00	601.12	53.12	548.00	684.35	560.60	123.75	19.66	0.15	19.51	1,829.70*	192.94*	1,636.76
Totals providing for the appropriation-in-aid of counterpart funds	404.50	75.00	329.50	636.77	110.77	526.00	601.12	103.12	498.00	684.35	560.60	123.75	19.66	0.15	19.51	1,829.70*	332.94*	1,496.76

● To avoid double-counting of payments by the Service Departments to the Ministry of Supply the cross totals of columns 2-6 have been reduced by £516.70 million.

† Includes the cost of development work undertaken by industry under contract, and the purchase of stores and equipment for research and development establishments.

## ANNEX III

## NORTH ATLANTIC TREATY ORGANISATION MILITARY STRUCTURE



NOTE.—Dotted line indicates liaison between North Atlantic Council in permanent session in Paris and the military authorities in Washington, which is effected through a Standing Group Liaison Officer in Paris

STATEMENT OF THE  
FIRST LORD OF THE ADMIRALTY EXPLANATORY  
OF THE NAVY ESTIMATES, 1953-54

(Cmd. 8769)

THE NET provision proposed for Navy services in 1953-54 would, without counterpart-aid, have been £364,500,000, which is an increase of £7,250,000 on the corresponding provision in the original estimates for the current year, or £4,250,000 if allowance is made for the supplementary estimate presented on January 20, 1953 (H.C. 58 of 1952-53). The latter is required to meet additional expenditure mainly due to higher prices and rates of pay and pensions, but also arising from extra commitments in respect of the Korean campaign, increased purchases from the textile industry, heavier liability for ratings' marriage allowances and better progress on new works services.

The grant required for 1953-54 is, however, reduced to £329,500,000 by an appropriation in aid of contract expenditure under Subhead A of Vote 8 III on ships and aircraft, of £35,000,000 of the sterling counterpart of defence support aid from the United States of America. The grant for 1952-53 was likewise reduced to £332,250,000 by the appropriation of £25,000,000 of counterpart funds (Revised Estimate H.C. 104 of 1951-52).

The estimates now presented reflect adjustments in the naval programme in accordance with the decision of H.M. Government that rearmament expenditure shall be spread over a longer period and held to a lower level, as explained in the Statement on Defence, 1953 (Cmd. 8768). Account has had to be taken of higher prices and increases in pay and pensions liability. Provision has also been made for the cost of telephone and telegraph services previously provided by the Post Office without repayment.

In accordance with announcements made last Autumn, the period for which officers and men are retained after the expiry of their normal engagements will be progressively reduced during the coming year. All officers and men compulsorily retained or recalled from the reserves will have been released by March 31, 1954, unless any serious unforeseen commitments arise. Subject to the same proviso no further Royal Fleet Reservists will be recalled for service.

I should like to place on record the Royal Navy's appreciation of the services rendered by all officers and men who have been affected by these emergency measures since they were introduced in 1950. They have made it possible to strengthen the seagoing Fleet considerably, to place the Reserve Fleet in a greater state of readiness and to strengthen other essential naval services.

Vote A provides for a maximum strength of 151,000 at the beginning of the year. There will be a substantial decline during the year as retained and recalled personnel leave the Navy. The effects of this decline on numbers of ships at sea will be kept to the minimum by reductions in complements ashore and afloat.

In the field of new construction, the bulk of the expenditure proposed in 1953-54 will be in respect of ships approved in earlier programmes on



which work is proceeding. In addition, I propose to begin a further programme of anti-submarine and minesweeping vessels, together with a number of miscellaneous small craft.

Allowing for sterling counterpart aid of £35,000,000, as explained above, the total provision for production and research in these Estimates is approximately £157,600,000 net. The comparable provision in the original Estimates for the current year was £163,000,000 net, after deducting £25,000,000 sterling counterpart aid, though this figure is modified by the supplementary estimate which I have already presented. Account has been taken of possible underspendings on contract work, etc.

(sd) J. P. L. THOMAS

## SOME NOTES ON NAVAL ACTIVITIES AND ADMIRALTY POLICY

### THE KOREAN CAMPAIGN

There has been little change in the pattern of naval operations in Korea during the year. Most of the ships on the Far East Station have been engaged, together with units of the United States Navy, the Royal Canadian, Australian, and New Zealand Navies, the French and the Royal Netherlands Navies, all under the command of a British Flag Officer, in blockade and escort duties off the west coast. Ships have also been attached periodically to the American forces operating on the east coast. Naval aircraft have harassed the enemy's land lines of communication and have spotted for ships' bombardments in the face of increasing fighter and anti-aircraft opposition. Cruisers, destroyers and frigates patrolling off the coast have had to contend with a minelaying campaign by the enemy and with strengthened coastal batteries. The threat presented by the United Nations Navies has contained large enemy ground forces.

The following ships of the Royal Navy have taken part in operations in Korean waters during the last twelve months:

- 2 Aircraft Carriers
- 4 Cruisers
- 7 Destroyers
- 10 Frigates
- 1 Aircraft Maintenance Carrier
- 1 Headquarters Ship

and a number of supporting vessels.

### SUEZ CANAL AREA

Throughout the year ships of the Mediterranean Fleet have been stationed in the Suez Canal area to safeguard British interests. Until April, 1952, they were required to berth and unberth merchant ships of all

nationalities to keep the Canal traffic operating. In April, however, the Egyptian authorities removed the last restriction and the Canal traffic returned to normal; the rôle of the Royal Navy then reverted to maintaining a watch on our interests.

#### MALAYA

Ships and motor launches have patrolled the coasts of Malaya to prevent gun-running and illegal immigration of bandits. Thirty-nine bombardments by destroyers, frigates, minesweepers and H.M.M.S. Pelandok and five air strikes from British carriers were carried out in support of security forces' operations.

#### CO-OPERATION WITH COMMONWEALTH AND ALLIED NAVIES

Four major North Atlantic Treaty Organisation tactical exercises have taken place during 1952-53, two in the Mediterranean and two in the Atlantic and home waters, namely:

"Castinets"—a maritime defence exercise conducted by Commander-in-Chief, Channel.

"Mainbrace"—a large scale exercise in co-operation between the forces of the Supreme Allied Commander Europe (SACEUR) and the Supreme Allied Commander Atlantic (SACLANT) in the defence of the northern flank of the North Atlantic Treaty Organisation, conducted by Commander-in-Chief North (CINCNORTH).

"Beehive II"—a Mediterranean convoy exercise conducted by Commander-in-Chief, Mediterranean.

"Longstep"—another Mediterranean convoy exercise conducted by Commander Allied Naval Forces Southern Europe (COMNAV-SOUTH).

Many small scale N.A.T.O. exercises have also been held both in home waters and in the Mediterranean, and Turkish ships took part in a N.A.T.O. exercise for the first time. Ships of N.A.T.O. countries visited the United Kingdom for anti-submarine training.

A joint exercise again took place in the Indian Ocean between ships of the East Indies Squadron, the Indian Navy, the Royal Pakistan Navy, and the Royal Ceylon Navy.

#### ATOMIC EXPLOSION AT MONTE BELLO

A special squadron consisting of H.M. Ships Campania, Plym, Tracker, Narvik, and Zeebrugge was formed to conduct the trials of the British atomic weapon at the Monte Bello Islands off North-western Australia.

#### REVIEW OF THE FLEET BY HER MAJESTY THE QUEEN ON THE OCCASION OF HER CORONATION

Her Majesty the Queen accompanied by Admiral of the Fleet His Royal Highness the Duke of Edinburgh will review the Fleet at Spithead on Monday, June 15, 1953, from H.M.S. Surprise.

Admiral Sir George Creasy, K.C.B., C.B.E., D.S.O., M.V.O., the Commander-in-Chief, Home Fleet, who will be the senior officer afloat, will be in command. Some 190 ships will represent the Royal Navy in the Review and 300 naval aircraft will take part in a flypast. A full representation of the Navies of the Commonwealth is expected.

In view of their close association with the Royal Navy Her Majesty has permitted the Admiralty to invite the Merchant Navy and Fishing Fleets. Invitations are also being addressed to foreign Naval Powers.

### STRENGTH OF THE FLEET

The table below shows the strength of the Fleet in classes (excluding vessels of the fleet train, attendant ships and numerous small craft).

	Active Fleet	Training and experimental (Special complements)	In Reserve, Reducing to Reserve	In course of construction*
Battleships ..	Vanguard		Anson Howe Duke of York King George V	—
Fleet Carriers ..	Eagle Indomitable	Indefatigable Implacable Illustrious	Victorious (a)	Ark Royal
Light Fleet Carriers	Theseus Glory Ocean	Triumph	Warrior (a)	Hermes Bulwark Albion Centaur Majestic (d) Leviathan (e) Hercules (e)
Aircraft Maintenance Ship employed on Trooping Duties	—	Perseus	—	
Cruisers ..	11	2	13	3 (e)
Destroyers ..	31	9	67	3
Frigates ..	31	17	113 (b)	13
Fast Minelayers	2	—	1	—
Monitors ..	—	—	2	—
Submarines ..	37	—	16	—
Minesweepers				
Ocean	23	3	38	—
Coastal ..	17	9	43	47
Inshore ..	8	2	33 (c)	48

\* Excludes submarines.

(a) Modernising.

(b) Excludes three refitting for loan to India, three refitting (in Denmark) for loan to Denmark, two refitting for loan to Norway.

(c) Includes those being fitted out for minesweeping.

(d) To be transferred to the Royal Australian Navy on completion.

(e) Work suspended.

### RESERVE FLEET REDEPLOYMENT

The state of preparedness of the Reserve Fleet has been improved during the course of the year by berthing the vessels alongside jetties as far as possible and removing certain of the ships, which are at a longer notice of readiness, to commercial ports where they are being dehumidified and maintained by contractors. It is hoped that this policy will lead to substantial savings and that, in addition, a considerable number of naval personnel will become available to serve with the active Fleet.

### TRANSFER OF H.M. SHIPS TO OTHER NAVIES

During the financial year 1952-53 ships have been transferred to other Commonwealth countries and to member countries of the North Atlantic Treaty Organisation as follows:

The light fleet carrier *Vengeance* has been lent to Australia and the light fleet carrier *Powerful*, which was laid down at the end of the war but on which work had been suspended, was sold to Canada. A destroyer was sold to South Africa and three frigates are being refitted for loan to India.

Three frigates are refitting in Denmark for loan to Denmark and two frigates are refitting for loan to Norway.

Two minesweepers, sold to Belgium as part of an agreement made in 1949, have been delivered.

The last of four submarines being lent to France was delivered.

In addition a landing craft (assault) was sold to Jordan.

### NAVAL AVIATION

Her Majesty the Queen paid an official visit to the headquarters of the Home Air Command at Lee-on-Solent on November 21, 1952. A parade was held in which all units of the Home Air Command were represented and over 100 aircraft took part in a fly past.

During the last year naval aircraft have continued to take an important part in the hostilities in Korea in support of the United Nations naval and land forces. Squadrons operating from H.M. Ships *Glory* and *Ocean* have carried out a record number of sorties against a vast variety of targets.

The modernisation of our naval air stations has made considerable progress. During the past year work on runway reconstruction and extension has been completed at two air stations while a third, formerly in reserve, was commissioned and is being developed to accept a major flying task. Two others are expected to re-open in 1953 on completion of work on their runways. The improvement of radio aids at naval air stations to provide for the operation of new types of aircraft continues and will be much helped by the receipt of equipment from the United States.

All of the aircraft carriers in the active Fleet have now been equipped with helicopters for search and rescue duties. Recently a special naval helicopter squadron has been formed for service in Malaya.

During the summer two R.N.V.R. Air Squadrons visited Malta for their summer training period. A newly-formed Royal Netherlands Navy Air

Squadron has been attached to the Royal Navy for training since the end of August, 1952 and except for periods of embarked training, is expected to remain in this country until the end of 1953.

## *NEW CONSTRUCTION AND CONVERSION OF H.M. SHIPS*

### GENERAL

1952-53 was the second complete financial year of the re-armament programme. Production, though attended by difficulties and delays chiefly caused by the shortage of steel, rose substantially above the level achieved in 1951-52. The decision of the Government to prevent any substantial rise above the high level of expenditure on defence production in 1952-53 means some reduction in the naval programme as previously planned, and it is expected that output in 1953-54 will be slightly less than in 1952-53. This adjustment to the programme will be made principally by the reduction or rephasing of follow-on orders, and a large scale cancellation of contracts has not been necessary. The only contracts for new ships which have been cancelled are those for a large hospital ship and for two fleet attendant tankers.

The Admiralty have been at pains to ensure that any difficulties caused to the shipbuilding industry will be reduced to a minimum and such difficulties as may occur should be transitory, since the demand for merchant shipping should ensure that capacity released from naval work is absorbed as soon as is physically possible.

Though the Royal Dockyards will be employed to the limit of the labour force available on the programme of repairs, refits, modernisations and conversions, the naval load on the ship repairing industry for this sort of work will be somewhat greater in 1953-54 than it was in 1952-53.

Provision made for ammunition, oil fuel and stores is on a reduced scale involving some drawing upon existing stocks.

### POLICY

The emphasis of the naval programme continues to be placed on the building up of the minesweeping and anti-submarine forces. The production of minesweepers and minesweeping equipment is being progressed with super-priority.

### NEW CONSTRUCTION

During the financial year 1953-54 work will continue on the fleet carrier Ark Royal and on the four light fleet carriers of the "Hermes" Class. Three of these light fleet carriers should be completed within twelve to eighteen months.

Of the "Daring" class destroyers two more, Duchess and Defender have now joined the Fleet and Dainty is about to do so: the remaining three are nearing completion.

The frigate and submarine programmes have suffered some delay from the steel shortage, but difficulties are being overcome and better progress should now be made.

Progress with the new minesweepers is being maintained though there

have been some delays arising inevitably from the introduction of a large programme of vessels of a new type embodying novel features and of a considerable size. The first vessels are nearly finished, and 1953-54 should witness a steady stream of completions, and more will be ordered during the year.

Most of the seaward defence boats and fast patrol boats on order should be completed before the end of 1953-54. Two experimental fast patrol boats are now in service.

It is expected that the small hospital ship which will, in peacetime, serve as a Royal Yacht for Her Majesty the Queen, will be completed during 1953-54.

#### MODERNISATION AND CONVERSION

Work continues on the fleet carrier *Victorious*, which is being reconstructed in Portsmouth Dockyard, to enable her to operate the latest types of naval aircraft. The light fleet carrier *Warrior* which is undergoing a less extensive modernisation is well advanced and the modernisation of the cruiser *Royalist* has been started. Conversion of the destroyers *Verulam*, *Venus*, *Virago* and *Orwell* to anti-submarine frigates has recently been completed, and a number of others are nearing completion.

A number of submarines have been modernized and others are in hand.

#### STANDARDISATION

The heavy demands of rearmament on technical staff to some extent limit the effort available for matériel standardisation, but steady progress is being made, not only within the naval service and with the other Forces of the Crown, but also in the international field with the United States and Canadian Navies and with the Navies of the other N.A.T.O. countries.

Particular attention is being paid to the adoption of the unified screw thread system, which is being used to an increasing extent in new equipment.

#### RESEARCH AND DEVELOPMENT

The main objectives of the Admiralty research and development programme, being based on the future strategic role of the Navy, remain unchanged, but the programmes have been completely reviewed since the announcement of changes in Government policy in relation to defence.

There has been steady progress in investigations designed to provide adequate defence against the threat of mines of a number of different types, against modern submarines of high underwater speed and endurance, and against aircraft. Anti-submarine weapons, both shipborne and airborne, far more effective than anything known during the last war are becoming available, and arrangements have been made to enable heavier and faster types of naval aircraft to be handled in, and operated from, our fleet carriers.

The efficiency of the propulsion machinery of ships and submarines has been greatly improved from the point of view of generating more power for a given weight of plant and more power for a given weight of fuel. Both these factors are of high importance as, apart from questions of speed and endurance, savings in weight and space achieved in these ways can be

applied to the improvement of ships' armaments. The Admiralty have full confidence that the work now in hand in the field of propulsion machinery for both surface ships and submarines will lead to marked advances in the immediate future, and that improved machinery of steam, internal combustion, and gas-turbine types will be available during the next few years.

Satisfactory progress is being maintained in naval contributions to the development of guided missiles and in electronic valve research which the Admiralty carries out on behalf of the three Services and the Ministry of Supply.

Good progress has been made in improving our means of co-ordination with N.A.T.O. naval authorities in the research and development field, and it is hoped to extend the range of subjects in which collaboration has been started.

The experiment of attaching a scientist to the seagoing staff of the Commander-in-Chief, Home Fleet, has been successful and a similar appointment will shortly be made in the Mediterranean Fleet.

## *NAVAL PERSONNEL*

### TERMINATION OF EMERGENCY MANPOWER MEASURES

All officers and men compulsorily retained or recalled from the reserves will be released by the end of March, 1954, unless any serious unforeseen commitments arise. In consequence the total Vote A strength will decline by about 10,000 over the financial year 1953-54.

In order to mitigate the effects of this loss of manpower on numbers of ships at sea, the maximum economies are being made in staffs ashore. Temporary reductions are also being made in the complements of many categories of ships at sea (excluding ships on the Far East Station). By these means, withdrawals of ships from the active Fleet to reserve will be kept to the minimum. It is hoped to restore the cuts in complements of ships at sea within two years.

There will be an extremely heavy volume of drafting movements next year, in view of the large numbers of retained and recalled men to be released and the re-deployment of personnel arising from the cuts in complements and the reduction of some ships to reserve mentioned above. In carrying out this complicated series of movements every effort will be made to reduce to the minimum any inconvenience to officers and men.

### OFFICERS

It will not be possible to begin the progressive reduction of the period of service of officers compulsorily retained on reaching retiring age, or on completing their normal engagements until October, 1953, but all such officers will be released by March 31, 1954. Officers who have volunteered from the Emergency and Retired Lists and the reserves will be required to serve for the full period of eighteen months for which they volunteered.

The release of all these officers would leave a serious shortage of experienced officers in the Fleet, and they have, therefore, been invited to volunteer to remain for a further period of from eighteen months to three

and a half years service. There has been a gratifying response to this invitation.

The number of boys of the right quality coming forward for cadetships in the executive and engineering branches has not been sufficient to enable all vacancies to be filled. A committee is studying ways and means of widening the scope of these cadet entries sufficiently to provide adequate numbers.

#### NAVAL PILOTS AND OBSERVERS

There has been a further considerable improvement in the recruitment of naval pilots and observers during the past year, the initial response to the scheme under which regular ratings are allowed to apply for short-service commissions of eight years having been an important contributory factor. There has also been a substantial improvement in the entry of national service men for training as pilots and observers. Further numbers of ex-naval pilots and observers have been re-entered on short-service commissions of from four to eight years.

The Royal Navy still requires substantial numbers of young men for training as aviators on short service (eight years) or on national service commissions. It is hoped that many who enter as national service men will subsequently volunteer for the short-service commissions of four years (which may be extended to eight years) which are available to them. Up to 20 per cent. of the short-service officers may be granted permanent commissions.

#### RATINGS AND OTHER RANKS

The progressive reduction of the eighteen months period of retention will begin in April next. Men whose normal engagements expire during the financial year 1953-54 will continue to be retained for diminishing periods, all retained personnel being released by March 31, 1954. The release scheme for retained men may be summarised as follows:

<i>Date of completion of normal engagement</i>	<i>Release date</i>	<i>Number of months retained</i>
October, 1951-April, 1952 ..	April-June, 1953 ..	18-14
May-December, 1952 ..	July-September, 1953 ..	14-9
January-August, 1953 ..	October-December, 1953 ..	9-4
September, 1953-March, 1954	January-March, 1954 ..	4-0

Some 8,250 Royal Fleet Reservists have been recalled for service since the outbreak of hostilities in Korea. All will be released by March 1954 and no further reservists will be recalled.

The release of all retained men and recalled reservists will mean a heavy loss of experienced men and will, inevitably, leave the Navy short of senior ratings, especially Petty Officers. Measures have, however, been taken in the last two years to speed up the training and advancement of ratings as far as practicable.

#### RE-ENGAGEMENT

The overall rate of re-engagement for pension has improved considerably since early 1950, but there is much room for further improvement in



certain branches. The numbers of men becoming eligible to re-engage in the next few years will be abnormally low, owing to the reduction in regular recruiting during the war, and it is particularly important that a high proportion should re-engage.

In order to encourage re-engagement, the £100 bounty is being extended until the end of 1953, and the minimum period of reckonable service required for a rating to be eligible to re-engage is being reduced from ten to eight years. Men will receive £75 of the bounty when they re-engage.

Very large numbers of men who entered on special service engagements after the war will be completing their seven years service in 1953-54 and subsequent years, and will become due for transfer to the Royal Fleet Reserve. The prospects of obtaining adequate numbers of senior ratings in the years to come will depend largely on how many of these ratings will elect to remain in the active Navy on continuous service engagements. Large numbers will be needed. It is, therefore, hoped that special service ratings will seriously consider the advantages of a long-service career in the Royal Navy.

#### RECRUITMENT

Although recruiting is, on the whole, satisfactory, there have been weaknesses in a number of categories. In particular larger numbers of youths (aged 16½ to 17½) and adults are required for the seamen and communications branches.

#### NATIONAL SERVICE

It is planned to enter nearly 4,000 national service men into the Navy in the coming year. As in the past year, an appreciable number of temporary commissions in the R.N.V.R. will be available to suitably qualified national service men.

#### RESERVES

The strength of the Royal Fleet Reserve has been falling recently, partly due to the continued retention of time-expired men and partly to a number of reservists coming to the end of their reserve engagements. It is, however, expected that with the termination of retentions by March 31, 1954, the numbers will increase to a bearing of about 20,000.

Recruitment of officers from the Merchant Navy to the Royal Naval Reserve (General Service) during 1952 has been satisfactory, except for engineers, but the entry of ratings from the Merchant Navy continues to be disappointing. A youth entry has, however, recently been instituted for this section of the reserve which it is hoped will improve the rate of recruitment. In the Royal Naval Reserve (Patrol Service) the entry of officers has been somewhat slow, but the recruitment of ratings, mainly from young fishermen who are deferred from national service while members of this reserve, has continued to be satisfactory. The overall strength of the Royal Naval Reserve is not expected to exceed 4,000 officers and ratings.

A steady increase has been made in the Royal Naval Volunteer Reserve, which it is expected will reach a strength of some 12,250 officers and men during the financial year 1953-54.

The Royal Marine Forces Volunteer Reserve has also made steady

progress, but it is not expected it will reach its present approved strength of 1,500 officers and other ranks in the financial year 1953-54.

Since recruitment began at the end of 1951 a total of 920 officers and ratings has been entered in the Women's Royal Naval Volunteer Reserve. It is hoped during the year to increase the numbers to about 1,600.

Voluntary refresher training will continue for certain members of the Royal Naval Volunteer Supplementary Reserve and the Women's Royal Naval Reserve, neither of which reserve has any training liability.

The Royal Naval Special Reserve, in which national servicemen of the Royal Navy and Royal Marines carry out their part-time service if they do not join the voluntary reserves, is expected to reach a bearing of about 10,000 during the year.

#### RETIRED PAY AND PENSIONS

Vote 13 provides for increased retired pay and pensions for certain officers and ratings on the lines laid down in the Pensions (Increase) Act, 1952, and for the improved scheme of widows' pensions and dependent children's allowances described in Cmd. 8741.

#### *SEA FLOODING IN HOLLAND AND THE EAST COAST OF THE UNITED KINGDOM*

When floods swept the seaboard of Holland and the East Coast of the United Kingdom early in February, the Royal Navy at once went into action, in concert with its sister Services, to help in the rescue and emergency repair work. Naval helicopters, large inflatable rafts, and craft belonging to the R.N. Rhine Squadron rescued large numbers of distressed Dutch people.

At home the Royal Navy, the Royal Marines, and the W.R.N.S., supported by Admiralty civilian officers and workpeople, successfully carried through a wide variety of unaccustomed tasks including filling breaches in the sea walls, rescuing and evacuating cattle, ferrying men and materials, and providing accommodation ships for repair workers.

The floods in their initial onslaught caught H.M. Submarine Sirdar at Sheerness in dry dock with some of her hull plates removed and submerged her. In an adjoining dock the frigate Berkeley Castle was thrown on her side with damage both to the ship and the dock. Both vessels have since been refloated.

#### *WORKS PROGRAMME 1953-54*

In the programme of new works which will be started in 1953-54, emphasis is placed especially on the logistic support of the Fleet, on the needs of the long-term research and development programme, and on essential improvements in shore accommodation for serving officers and men.

Included among the important works services in hand to be continued are the extension of runways and improvement of living accommodation at certain Royal Naval Air Stations. The construction of premises at Herstmonceux, to accommodate the instruments and equipment which

remain to be transferred from the Royal Observatory at Greenwich, will be progressed at the best economical speed.

Provision has been made for building married quarters at home and abroad at an improved rate.

### *THE ADMIRALTY OFFICE*

The headquarters staff of the Admiralty has remained at approximately the same level throughout the year in spite of the heavy pressure of work arising from the rearmament programme. Essential increases in design and production staff have been compensated by reductions elsewhere. No major change is expected in the forthcoming year.

### *EVENTS OF NAVAL INTEREST DURING THE YEAR*

#### *VISIT TO FINLAND*

When His Royal Highness the Duke of Edinburgh travelled from Oslo to Helsinki in July, 1952, in Trinity House Vessel Patricia for the Olympic Games, an escort was provided by H.M.S. Swiftsure. This was the first visit by one of H.M. Ships to Finland for some years.

#### *FIRST SEA LORD'S TOUR*

The First Sea Lord, Admiral Sir Rhoderick McGrigor, G.C.B., D.S.O., carried out an extensive tour in the autumn last year of naval establishments in the East and the Far East, and visited nearly every Commonwealth warship operating in Korean waters. Admiral McGrigor returned to the United Kingdom *via* Canada, where he conferred with senior officers of the Royal Canadian Navy.

#### *VISITS TO SPAIN*

The resumption of Fleet visits to Spain took place in September last year, the most important visit being that to Barcelona by Flag Officer, Flotillas, Mediterranean, in H.M.S. Glory accompanied by three destroyers.

#### *VISIT OF H.M.N.Z.S. BELLONA*

H.M.N.Z.S. Bellona, whilst on a training cruise to the United Kingdom, took part in Exercise "Mainbrace" (see page 159), although New Zealand is not a member of the North Atlantic Treaty Organisation. On October, 16, 1952, the Board of Admiralty visited H.M.N.Z.S. Bellona at Portsmouth.

#### *COLONIAL NAVIES*

In May, 1952, Her Majesty approved the grant to the Malayan Naval Force and the East African Naval Force of the titles "Royal Malayan Navy" and "Royal East African Navy" respectively.

#### *THE LAUNCH OF H.M.S. HERMES*

The Light Fleet Carrier H.M.S. Hermes which gives her name to the class of four light fleet carriers under construction (see page 170) was launched on February 16, 1953, by Mrs. Winston Churchill.

PRESENTATION OF COLOURS TO THE 3RD COMMANDO BRIGADE ROYAL  
MARINES

His Royal Highness the Duke of Edinburgh, K.G., K.T., visited ships and establishments of the Royal Navy in November last year while at Malta to present the Queen's and Regimental Colours to the three Commandos of the Third Commando Brigade Royal Marines now stationed in the Island and lately returned from Malaya.

MISCELLANEOUS

H.M.S. Georgetown and H.M.S. Lincoln, two destroyers lent to the U.S.S.R. in 1944, were successfully towed back to the United Kingdom from Murmansk in August–September, 1952. They were handed over to the British Iron and Steel Corporation for breaking up.

H.M.S. Sheffield visited Valparaiso for the inauguration of President Ibanez on November 3, 1952, and parties from her took part in the ceremonies. The ship headed the line of foreign warships at the Naval Review.

# ABSTRACT OF NAVY

Vote	Service	ESTIMATES, 1953-54		
A	Maximum number of officers, seamen, boys and Royal Marines, and members of the Women's Royal Naval Service and the Naval Nursing Service.	<i>Maximum Numbers</i>		
		151,000		
		Gross Estimate	Appropriations in Aid	Net Estimate
		£	£	£
1	Pay, etc., of the Royal Navy and Royal Marines .. .. .	50,348,000	488,000	49,860,000
2	Victualling and clothing for the Navy .. .. .	2,5712,000	7,412,000	18,300,000
3	Medical establishments and services .. .. .	1,444,000	59,000	1,385,000
4	Civilians employed on Fleet services .. .. .	7,593,000	75,000	7,518,000
5	Educational Services .. .. .	1,037,000	89,000	948,000
6	Scientific services .. .. .	15,332,000	661,000	14,671,000
7	Royal Naval Reserves .. .. .	1,534,100	100	1,534,000
8	Shipbuilding, repairs, maintenance, etc.			
	Section I.—Personnel .. .. .	34,985,000	294,000	34,691,000
	Section II.—Matériel .. .. .	78,192,000	15,500,000	62,692,000
	Section III.—Contract work .. .. .	97,378,000	38,676,000	58,702,000
9	Naval armaments .. .. .	34,382,000	5,570,000	28,812,000
10	Works, buildings and repairs at home and abroad .. .. .	19,445,000	1,405,000	18,040,000
11	Miscellaneous effective services .. .. .	11,880,800	3,079,900	8,800,900
12	Admiralty office .. .. .	6,922,000	12,000	6,910,000
13	Non-effective services .. .. .	16,803,000	196,000	16,607,000
14	Merchant shipbuilding and repair .. .. .	39,000	10,000	29,000
15	Additional married quarters .. .. .	1,473,100	1,473,000	100
..	Total .. .. .	£ 404,500,000	75,000,000	329,500,000

Admiralty,  
February 10, 1953 }

J. P. L. THOMAS  
R. R. McGRIGOR

A. MADDEN  
M. M. DENNY

ESTIMATES, 1953-54

Estimates, 1952-53			Difference on Net Estimates	
<i>Maximum Numbers</i> 153,000			<i>Decrease</i> 2,000	
Gross Estimate	Appropriations in Aid	Net Estimate	Increase	Decrease
£	£	£	£	£
50,253,000	400,000	49,853,000	7,000	—
28,592,000	9,135,000	19,457,000	—	1,157,000
1,408,000	56,000	1,352,000	33,000	—
7,236,000	55,000	7,181,000	337,000	—
1,008,000	98,000	910,000	.. 38,000	—
15,204,000	642,000	14,562,000	.. 109,000	—
1,460,100	100	1,460,000	.. 74,000	—
32,208,000	223,000	31,985,000	2,706,000	—
82,169,000	10,219,000	71,950,000	—	9,258,000
81,413,000	28,513,000	52,900,000	5,802,000	—
42,848,000	6,128,000	36,720,000	—	7,908,000
15,829,000	1,250,000	14,579,000	3,461,000	—
9,799,800	2,452,900	7,346,900	1,454,000	—
6,876,000	10,000	6,866,000	44,000	—
15,264,000	.. 158,000	15,106,000	1,501,000	—
32,000	.. 10,000	22,000	7,000	—
2,150,100	2,150,000	100	—	—
393,750,000	61,500,000	332,250,000	15,573,000	18,323,000
.. Net decrease.. ..			£2,750,000	

S. M. RAW ..... G. GRANTHAM  
E. W. ANSTICE .. G. BARNARD

ALLAN NOBLE  
S. WINGFIELD DIGBY  
J. G. LANG



MEMORANDUM OF THE  
SECRETARY OF STATE FOR WAR RELATING TO  
THE ARMY ESTIMATES, 1953-54  
(Cmd. 8770)

*PREFACE*

1. EXCLUDING THE receipts arising from the sterling counterpart of defence support aid received from the United States of America (*see* paragraph 3 below), the Army Estimates for 1953-54 amount to:

Gross Expenditure	..	..	..	£ 636,770,100
Appropriations in Aid	..	..	..	55,770,000
Net Expenditure	..	..	..	<u>£581,000,100</u>

2. On the same basis the figures for the three previous years were:

		1952-53	1951-52	1950-51
		£	£	£
Gross Expenditure	.. ..	585,970,100	466,520,100	341,600,100
Appropriations in Aid	.. ..	64,470,000	47,720,000	42,600,000
		<u>£521,500,100</u>	<u>£418,800,000</u>	<u>£299,000,100</u>

(Excluding Supplementary Estimates).

3. The figures in paragraphs 1 and 2 do not include the receipts appropriated in aid of Army funds arising from the sterling counterpart of defence support aid received from the United States of America towards the defence burden undertaken by the United Kingdom in the common cause. In 1952-53 these amounted to £30,000,000 (H.C. 100 1951-52) and the sum of £55,000,000 is included on this account in the appropriations in aid for 1953-54.

4. The gross expenditure in the Army Estimates for 1953-54 is £50,800,000 more than in the Estimates for 1952-53. Several factors are responsible for this. A gratifying increase in the regular strength of the Army necessitates high provision for pay and allowances (Vote 1). The gradual accumulation of stores as the rearmament programme gathers way adds greatly to the administrative tasks of the Army and requires the employment in the new and expanded storehouses of additional numbers of civilians (Vote 4) to which I refer again later in this memorandum. Increased fares, freight rates and prices are largely responsible for rises in Votes 5 (Movements) and 6 (Supplies). The transfer on April 1, 1953, to Army Votes of charges for telegraph and telephone services which have hitherto been borne by the General Post Office has increased Vote 9. And the introduction of the new scheme of pensions for the widows of officers and other ranks and of higher rates of pension for military and civilian personnel following the Pensions (Increase) Act, 1952, have put



up Vote 10. The provision for works services (Vote 8) shows only a slight increase and that for married quarters to be paid for under the Armed Forces (Housing Loans) Act, 1949 (Vote 11), is unchanged.

5. Excluding the receipts in respect of the sterling counterpart of United States defence support aid the appropriations in aid in the Estimates for 1953-54 are £8,700,000 lower than for 1952-53. The decreases are due mainly to the fact that in 1953-54 no contribution will be received from the Colonial and Middle Eastern Services Vote towards the cost of the British and colonial troops in Malaya (Vote 1) and to reduced receipts for the use of civilian staff (Vote 4) and reduced sales of stores and fixed assets (Votes 7 and 8).

### OPERATIONAL

6. During the past year very heavy demands have been made on the British Army. Never before in peace-time has such a high proportion of the Army been overseas and even at its present size, the equivalent of 11½ divisions, it is fully stretched in meeting our overseas commitments. In many theatres it is carrying out difficult and often dangerous tasks in conditions of hardship and discomfort. Despite these heavy demands the regular soldier and the national serviceman have combined together to create an Army whose morale is high and which has met every task with cheerfulness and efficiency.

7. Inevitably such a situation causes strain and this is felt most strongly among the middle-piece officers and non-commissioned officers who are married. Although many steps have been taken to reduce changes of station and separation of families and although infantry and Royal Armoured Corps units now move as units on three-year tours, nevertheless unexpected demands caused by the cold war and the need for reinforcements in distant theatres have caused much separation and difficulty.

8. There has been some tendency during the past year for regular married non-commissioned officers to leave the Army. We are doing everything possible to reduce and limit the causes of this trend, but it is largely the consequence of the shortage of married quarters and the many unpredictable moves caused by the cold war.

9. There are not many opportunities for telling the House of Commons or the general public about the Army's tasks and duties overseas. They are important and onerous but seldom of a kind which justify special statements or particular notice in the Press. I therefore thought it would be of interest if I were to expand the brief operational section normally contained in this memorandum by including short statements from the main commands or formations overseas. These are given below.

### KOREA

10. Of the 20,000 men now in the Commonwealth Division some 10,000 are from the United Kingdom, and of these about half are national servicemen. Throughout 1952 the Division has been located in the same general area, and this has led to many people thinking that not much is going on in Korea. The year has been one of static warfare, but this has not meant inactivity. There has been continuous patrolling and raiding on both sides. The Communists have also launched a number of fierce

attacks of about battalion strength, supported by artillery, which became more intense in the last three months of 1952. The Division has had its share of these, but has always stood firm and has not yielded one inch of ground. Many of our soldiers are young, but that has not stopped them from standing up to the Communists and the severe climate.

11. The Communist attacks are very much of a pattern. They are preceded by a heavy artillery bombardment which probably lasts a day or two and culminates in about thirty minutes of saturation shelling at dusk during which anything up to 3,000 shells and mortar bombs may fall on one company area. This is the signal for the Communist infantry to advance, and they do so in large numbers and with such speed that they usually catch up their own artillery barrage which kills a certain number of them. During this advance our artillery pounds the enemy infantry and inflicts severe casualties on them, particularly when they are bunching on our barbed wire defences, but always a certain number get through and reach our trenches—and then comes the inevitable climax, the infantry battle, and it is an inspiration to see men from England, Scotland, Wales and Ireland fighting shoulder to shoulder throughout the night with their comrades from Canada, Australia and New Zealand. The beastliness of war is for a moment overshadowed by this enduring bravery and friendship.

12. Such battles are bitter enough but so far they have not lasted very long—by dawn the Communists are in retreat—and the real hardship for the front-line soldier is his normal routine life, a life which is bounded by digging, patrolling, sleeping. He works by night and sleeps by day because enemy shelling prohibits any real daylight activity. Night patrolling is probably the most wearing of all jobs (unless it be minelaying and mine-gapping) and it calls for coldblooded courage. It has to be done in order to keep a check on the enemy dispositions and movements and in order to stop the enemy reconnoitering our own positions, but it is very tiring and nerve wracking and calls for considerable self-control and leadership. The other main activities by night are digging and wiring—it is impossible to have bunkers and trenches too deep or to have sufficient barbed wire in front of them and this means that there is work for every man throughout the night, whatever the weather conditions.

13. In addition to patrols our operational activities include raids on enemy positions with the object of stopping an enemy build-up, taking prisoners and retaining the initiative. These raids are virtually full-scale attacks and are carried out with the preparation and precision of a large scale operation, all arms being involved.

14. British casualties in the Division have not been light; in 1952 they numbered 196 killed and 650 missing, wounded or prisoners of war. Morale, however, remains as high as ever and we are proud to be fighting in the Commonwealth Division, which is probably the best found formation in our military history.

15. The weather varies from tropical heat to arctic cold and the fact that the health of the Division is so good says much for our special summer and winter clothing. As the year nears its end, winter is with us and the thermometer shows 20 to 30 degrees of frost every night; this is quite bearable in a heated dugout or tent, but it is very, very cold for a man patrolling in no-man's-land. Sentries have to be relieved every hour or so, vehicles have to be started up at intervals all through the night, wireless sets have to

be worked continuously; in fact during the winter a large part of our resources are devoted to defeating the weather.

16. But in spite of everything we are more than holding our own with both the Communists and the weather. Things are tough and getting tougher, but so are we.

#### THE FAR EAST

17. The Far East Command, like Gaul, is divided into three parts, Malaya, Singapore, and Hong Kong. In each of these we are compelled to maintain strong garrisons to fulfil our hot, warm, and cold war commitments in South East Asia. In Malaya the Army, acting in aid of the civil power, is still fighting a hot war against Communist terrorism; in Singapore it is responsible for organising and operating our main base for the Far East; and in Hong Kong it guards the Colony from the Communist menace across the border in China.

18. In Malaya we have British and Gurkha soldiers, troops from New Zealand, Southern Rhodesia, East Africa, and Fiji, and the locally raised forces of both the Malay Regiment and the newly formed Federation Regiment which includes all races in Malaya, *i.e.* Chinese, etc., as well as Malays. The troops in Hong Kong are mainly British with a few Gurkhas.

19. In Malaya the job of the Army is to seek out and destroy the Communist terrorists, operating in a particularly trying climate and most difficult country. The enemy is skilful and unscrupulous and is very difficult to bring to battle. His armed forces normally live deep in the jungle and come out to terrorise the populace, obtain food, lay ambushes, and to attack isolated posts to capture arms. They are backed by numerous sympathisers both in and out of uniform, willing and unwilling.

20. The Army is very dependent on good information which is provided mainly by the police. But the Army does not merely sit back and wait for information. Many are the tasks which come the soldier's way in the course of trying to win the public's confidence and so increase the flow of information. They vary from assistance to the Home Guard and military band concerts in villages—which are most popular—to long and arduous patrols designed to obtain a complete knowledge of the country and local conditions.

21. The infantry, of whom there are 23 battalions in Malaya, are mainly deployed in company bases normally some distance apart and located in or near rubber estates, tin mines and villages. The soldier in one of these company bases is kept fully occupied on operations in both the rubber estates and the jungle itself. He may be called upon to take part in a 48-hour ambush requiring him to keep concealed and quiet throughout under most trying conditions, or he may be involved in a drive through the dense jungle forest lasting anything up to three weeks. A typical action may be started by the leading scout contacting a terrorist sentry; the terrorists, if in ambush positions, will be very well concealed, and will hold their fire until the best moment, when they are capable of producing accurate and sustained fire. On making contact our troops carry out a quick drill which usually entails making an assault on the terrorist positions combined with an encircling movement. It is very difficult to move quickly or silently in the jungle, and as visibility is very restricted, it is always easy for the terrorists to disperse and get away.

22. However, it should not be supposed that contacts with the terrorists are an everyday occurrence. A soldier may spend many days on operations without any sign of the terrorists. Such operations, though necessary, tend to become monotonous, but this monotony must not be allowed to lead to carelessness, for with carelessness comes death. The tension of this war of nerves with an unseen enemy in the jungle should be kept in mind when thinking of our soldiers in Malaya.

23. If in the jungle for any length of time, the troops are supplied by air, the technique for dropping rations, mail, and comforts having been most effectively developed in conjunction with the Royal Air Force. Emergency cases are evacuated by helicopter. But with training and experience, sickness and casualties on these long operations are kept down to a very low figure. Individual resource and self-reliance are essential in the jungle and all men learn these attributes. It is a hard and effective training ground for our young men and junior leaders.

24. Sometimes there are larger operations by one or more battalions. Success in all these various forms of operations can be achieved only by the very closest co-operation between the Army and the police and the civil authorities. It is mainly an infantry war, but the armoured cars of the Royal Armoured Corps are vital for escorting convoys of supplies both civilian and military and for patrolling roads generally. The Royal Artillery are used for harassing the terrorists and for driving them into places where they can be caught by the infantry. The Special Air Service Regiment is now capable of parachuting into the deepest and most remote jungle, thereby achieving speed and surprise. The recent improvement in the situation, shown by a decline in terrorist activity and a decrease in our casualties, is due in no small part to the efforts of our troops.

25. The importance of Singapore as our main supply base in the Far East should be mentioned. Whilst there is little of immediate spectacular interest to report from there, much work is continually going on in planning and organising this base and its defences to make it ready for any future requirements. Meanwhile it holds and supplies all the current daily needs of our forces in the East.

26. In Hong Kong we have the lukewarm war. There our troops have to be constantly on the alert ready to deal with any aggression against the Colony. They mostly live in temporary camps out in the New Territories. Conditions are not easy, and the Army spends its time training hard and working on its defences. This year good progress has been made in the preparation of obstacles covering our frontier defences. Not only has the Army in Hong Kong to train itself, but it is also responsible for training the bulk of our infantry reinforcements for Korea and holding them until they have reached the age, length of service, and efficiency required before they can go on to Japan and thence to Korea.

27. In both Malaya and the New Territories of Hong Kong a considerable amount of the accommodation is in huts or tents. This is far from ideal, but the necessity to reinforce the peacetime garrison and financial reasons have forced this position on us. We do everything in our power to improve conditions, and arrangements for looking after the welfare of the troops are good within financial limitations. But a point worth noting is the great distance they are from home—Hong Kong is 10,000 sea miles—and the hardship this one factor alone can cause, particularly among

families. There is a shortage of accommodation for families, though this year we have built some 200 temporary married quarters in the New Territories of Hong Kong. Altogether a total of 370 married quarters have been built in the Far East this year. Even so the average time an officer or other rank has to wait before he is allotted accommodation for his family is 12-18 months.

28. In conclusion it should be noted that a considerable part of the Army is today serving in the Far East under active service or near active service conditions. Their task is the "containment" of the vast forces of Communist China which face them. On their success depends the security of all South East Asia.

### THE MIDDLE EAST

29. To many people the Middle East means little more than the area through which the Suez Canal passes. This note may serve at least to remind everyone of the wide area which it covers, and of the complexity and importance of the many problems which are associated with it. It is a perplexed and perplexing area, and a source of much anxiety, both political and military. Amid its surgings and confusions, the British soldier goes quietly about his business, the embodiment of efficiency, good sense, and good temper.

30. Although there is only space to refer now to the principal events of the past year, it must be remembered that the presence of our troops and the dignity of their bearing have had a stabilising effect in other areas, such as Malta, Cyprus, Libya, and the Sudan.

31. *Egypt.* The year has been one of interrupted political negotiation and military uncertainty. It has been necessary to keep in addition to our normal garrison the 3rd Infantry Division and the 16th Independent Parachute Brigade ready to protect our interests. There is no doubt that the presence of a substantial British garrison in Egypt has enabled us to maintain our base and thus the ability to defend the Middle East.

32. The large number of troops in the Canal Zone has raised an extremely difficult accommodation problem. Even before the abrogation of the Egyptian treaty all single officers and men lived in tents and the number of married quarters was inadequate. As a result of the troubles of last winter married quarters outside the protected areas of camps have had to be given up. Meanwhile the military population of the Canal Zone has been doubled. The discomfort and difficulties under which our garrison lives have thereby been greatly increased. Since the abrogation of the treaty some £600,000 has been spent on accommodation. It will be necessary to take further action of the same nature next year, but our main effort will be put into certain projects which are designed to provide a more permanent solution. Work has started on building in Cyprus. It is difficult to make precise plans in such an uncertain political atmosphere and it is certain that for some years ahead accommodation for our troops and families will not be what we should wish. We are doing our utmost.

33. Since the major clash with the Egyptian police in Ismailia in January, 1952, the dull routine of internal security work has largely been unrelieved. Much time has been spent in tedious guard duties and the patrolling of our installations. Constant vigilance has been necessary to safeguard our stores from pilfering.

34. Every opportunity has been taken to train formations for operations in the desert. Exercises have been held not only in the Canal Zone, but also in Jordan, where the Arab Legion has co-operated wholeheartedly. With the help of the Royal Air Force the men of the 16th Independent Parachute Brigade have carried out practice jumps both individually and as units on exercises. Accidents have been few. The special techniques of all aspects of parachute operations have also been practised and kept alive and up to date.

35. *Greece.* The end of April saw the closure of the British Military Mission to Greece. Since 1946 this Mission had been providing valuable advice and training facilities to the Greek Army, and during 1948 and 1949 had assisted this Army in its operations against the Communist guerillas. Their efforts had been greatly appreciated by the Greeks, and the efficiency of the new Greek Army is a tribute to their work. Our Mission left Greece knowing that the training of the Greek Army on western lines will continue under the guidance of an American Mission.

36. *Eritrea.* The British Army has played its part in the protection and administration of Eritrea for the past seven years. On September 15, 1952, the last British unit, the 1st Battalion of the South Wales Borderers, was finally withdrawn. This unit had spent two and a half years in the country and, with the Royal Berkshires who left earlier in the year, had in the traditional British way materially helped to keep Eritrea settled and stable until handing over their responsibilities to the Ethiopian Army.

37. *Kenya.* The steps taken by the Governor in October 1952 to deal with the state of emergency in the Colony included the full use of the Kenya police and of every available unit of the Army in East Africa Command. No less than five battalions of the King's African Rifles and the Kenya Regiment have been used to support the police in the preservation of ordered government. Over 400 men of the 1st Battalion of the Lancashire Fusiliers from the Canal Zone were flown to Nairobi at the very outset of the operations. The arrival of a battalion of British infantry of the line in the Colony for the first time for 28 years did much to restore the confidence of the Europeans and loyal African population and to discourage dissident Africans from further lawlessness. The transport of this battalion by 32 aircraft of the Royal Air Force Transport Command was carried out speedily and without hitch. In the meantime our soldiers continue to patrol the forests and to assist the police to round up those responsible for murder, attempted murder, assault, and arson.

#### THE BRITISH ARMY OF THE RHINE.

38. Since the last Estimates were presented considerable changes have occurred in the British Army of the Rhine. The arrival of the 6th Armoured Division built up the strength of this army to three armoured divisions and one infantry division. Such a force, existing in peace-time, fully equipped and trained, is a contribution in peace to the defence of Western Europe of which the country and the British Army may justly feel proud. It is 49.6 per cent. regular; 52 per cent. of its officers are long service regulars and 46.9 per cent. of its men are regulars. Its national servicemen are on a two years' period of service which means to say that a large proportion of them would go into battle as fully trained, fully

exercised and, up to the limit which peace-time soldiering will permit, experienced soldiers. This is a great contribution.

39. This strong British element has been augmented by the arrival in Germany of the 27th Canadian Infantry Brigade Group, a composite formation of all arms including armour, which for training and operations is placed under the command of the Commander-in-Chief, British Army of the Rhine.

40. The spring, summer, and autumn of 1952 were devoted to intensive training, both unit and formation, with the object of creating a Corps capable of manoeuvre and battle, a machinery of command and control equal to any demand which might be made upon it, and with soldiers fit, tough, and well-trained. By the end of the autumn this object had been achieved. The manoeuvres showed that there were certain weaknesses in individual training which it is fair to say stemmed from too much higher formation training, so that, whilst success in higher training had unquestionably been achieved, this had to a certain extent been at the expense of certain aspects of individual training. This has been remedied during the winter. It can confidently be said that there is now in Germany, as part of the forces for the defence of Western Europe, an army which is as good as, if not better than, any which the British Army has ever seen before in time of peace. Training is sound, morale is high, discipline is good and crime is low.

41. Mention should be made of two tasks which fall to the British forces in Germany and which will continue after ratification of the Bonn Conventions. The first is patrolling the eastern frontier—an onerous and continuous task—the security of which is a British responsibility on the northern sector. The second is Berlin, where the British garrison plays a most important part in the cold war. The British soldiers in Berlin are constantly under observation; they are constantly walking on thin ice; their smartness and good humour are something of which we can feel justly proud.

42. Special attention has been paid to financial economy. Despite the arrival of the 6th Armoured Division early in 1952 and the absorption of part of the Control Commission, the number of Germans employed has been reduced during the last year by over 20,000. Considerable reduction in the number of requisitioned properties, for which rent is payable, has also been effected, with a consequent reduction in expenditure on public utilities.

43. On 1 December, 1952, the title of the Headquarters of the Commander-in-Chief, British Army of the Rhine, was changed from Headquarters, British Army of the Rhine to Headquarters, Northern Army Group. The significance of this change is that it brings out the allied responsibilities of the Commander-in-Chief, who in addition to commanding the British Army of the Rhine in peace is the Commander designate, in war, of the Belgian, Netherlands and British forces who form the Northern Army Group of the Allied Land Forces, Central Europe. In pursuance of these allied responsibilities a great effort has, in the last year, been put into building up the Allied team. The Headquarters of Northern Army Group now contains a number of Belgian and Netherlands officers in responsible positions. There have been a series of exercises, on an allied basis, culminating in the very successful exercise Hold Fast in

September, 1952, in which a Belgian, a British, and a Netherlands Corps took part, under Headquarters, Northern Army Group, and in association with the 2nd Allied Tactical Air Force. The allied team has made great advances in the last year.

## MANPOWER

### ACTIVE ARMY

44. *General.* We continue to experience difficulty in finding enough men for all the tasks we have to do, and things are not made easier by the release of time-expired regulars which began in January, 1952. Although I am sure we were right in deciding to release these men, we greatly miss their experience which cannot be replaced easily or quickly.

45. *Regular Soldiers.* In May, 1952, we introduced a new engagement for 22 years' colour service (with the right to leave at the end of each three-year period). This completed our plans to rationalise and modernise the Army's terms of service. This new engagement, together with that for three years' colour followed by four years' reserve service introduced in November 1951, are now the only engagements generally open. Certain short-service engagements remain open to special categories of men, and engagements of eight years' colour service followed by four years' reserve service and six years' colour service followed by three years' reserve service remain for boys. We plan to re-introduce discharge by purchase in the autumn of 1953.

46. The success of the new engagements has been striking. During 1952, 43,100 men and boys enlisted from civil life compared with 18,800 in 1951. Of the number enlisting between May and December, 1952, an average of 22 per cent. took the new 22-year engagement; and by December, 37 per cent. of all those enlisting were taking this engagement. The number of serving national servicemen transferring to regular engagements rose from 4,604 in 1951 to 8,306 in 1952. Total recruitment from all sources, including boys and short-service engagements, was 53,226 in 1952 compared with 26,372 in 1951.

47. Most regular recruits inevitably come from the same field as national servicemen; consequently an increase in regular entry automatically causes a reduction in the national service intake. Thus whilst increased regular recruiting naturally improves the ratio between regulars and national servicemen, and this is a most desirable thing, it does not necessarily produce any immediate increase in total strength. Moreover regular recruits are now committed to an initial period of only three years compared with a minimum of five years in the past, and we must remember this when we look at the figures of regular recruitment. In the long run substantial and sustained improvement in the regular strength will depend largely on the extent to which men on the new engagements decide to remain in the Service beyond their initial three years.

48. During 1952 there was a reduction in the number of men who continued their colour service after their current engagements had ended. The combined total of extensions and re-engagements in 1951 was 7,183. In 1952 this figure fell to 7,024, but of these 2,320 men transferred to the new 22-year engagement, under which they have the right, on giving due



notice, to leave the Colours at the end of each successive period of three years.

49. The release of regulars and decline in re-engagements and extensions together cause a reduction in the proportion of longer service men which worries me considerably. We are having more and more difficulty in finding long-service warrant officers and senior non-commissioned officers. We want men to stay in the Army and are trying hard to improve conditions of service so that they do stay.

50. *National Servicemen.* The allocation of national servicemen to the Army in 1953-54 will be some 26,000 less than in 1952-53, but it will be sufficient to maintain the male strength of the Army at an approximately constant level during the year. The number of national servicemen serving at the end of the financial year 1953-54 is expected to be about 14,000 less than the present total, but this decline will be almost exactly balanced by the expected increase in regular strength. Nevertheless the national service element of the Army at the end of 1953-54 will represent 51 per cent. of its other rank strength and 48 per cent. of its total male strength (including officers). What is more, we depend on national service to provide over 4,000 junior officers and about half our junior non-commissioned officers (up to the rank of corporal). The call up of deferred apprentices is an important source of skilled tradesmen, and the increasing number now becoming available (it was 27,500 in 1951-52 compared with 19,000 in 1950-51) has gone some way towards meeting the loss of trained regular tradesmen resulting from the release of regulars.

51. All this underlines the Army's dependence on national service to enable it to fulfil the many tasks to which I have referred earlier in this memorandum.

52. *Officers.* We are still very short of officers for the Active Army, particularly of young regular officers in the technical arms, although there has been slight improvement since last year. We have done two things to try to improve the position in the technical arms.

(a) A scheme has been introduced under which young men who have passed or been exempted from the Intermediate Science Examination of London University can be accepted for regular commissions in the technical arms after graduating at the Military College of Science.

(b) A boarding school has been founded at Welbeck Abbey which will cater for boys entering between the ages of  $15\frac{1}{2}$  and  $16\frac{1}{2}$  years. After two years at Welbeck they will go to the Royal Military Academy, Sandhurst, with a view to being commissioned into the technical arms. The College will open in September 1953, with a capacity of 50 boys at the outset, increasing by the spring of 1955 to a maximum of 150.

53. We have recently started an extended service commission scheme under which suitable short-service officers can be granted commissions with greater security of tenure and carrying a pension after 20 years' reckonable service. This will offer a career and pension to officers who have served us well, and will help to reduce the serious shortage which might otherwise have resulted from the loss of short service officers whose period of service on the active list is due to end.

54. There is another shortage which must be mentioned here—namely that of medical officers. The position is especially bad in the case of specialists. The problem is being studied in conjunction with the Admiralty and Air Ministry and I hope to be able to announce the outcome of the examination in the near future.

55. *Situation in units.* Altogether, apart from the specific shortages which I have mentioned, the Army is some 3,000 officers and 5,000 other ranks below its full requirements. The result is that units are not up to their full strength, a state of affairs which we are endeavouring to overcome by the maximum economy in the use of manpower in depots, training establishments, etc., and all the other means at our disposal.

#### WOMEN'S SERVICES

56. *Queen Alexandra's Royal Army Nursing Corps.* Our thanks are due to the nurses who serve in the Queen Alexandra's Royal Army Nursing Corps and who manage to keep Army nursing at such a high standard in spite of the fact that the Corps is some 34 per cent. below establishment. To help overcome this, part-time civilian nurses are still being employed in military hospitals at home and overseas.

57. As regards other ranks a good standard of recruit is being maintained and the total strength on December 31, 1952, was 835, compared with 576 on December 31, 1951.

58. *Women's Royal Army Corps.* We are continuing our attempts to make service in the Women's Royal Army Corps more attractive. Among measures now being introduced to this end are improvements in dress, a new procedure enabling women on enlistment to elect to be employed in specific Corps of the Army throughout their career, the opening of additional technical trades to women, and the formation of an experimental local service unit. The green No. 1 Dress is now in general issue at home and has already proved an incentive to recruiting.

59. Recruiting has improved markedly over the last year and 3,234 women joined in 1952, compared with 2,402 in 1951. The strength of the Corps on December 31, 1952, was 6,894, compared with 5,985 a year earlier. I want to expand it still further. There are still many jobs in the Army which women can do as well as, or better than, men.

#### RESERVE ARMY

60. With some reservations I think we can claim that the build-up of the Reserve Army (comprising the Army Emergency Reserve and the Territorial Army) continues satisfactorily. We have had difficulties over the shortage of junior officers, a continuing deficiency of warrant officers and serjeants and some lack of balance in the intake of national servicemen between the Army Emergency Reserve and the Territorial Army. The growing strength of the Reserve Army imposes an increasing load, both in training and administration, on that hard core of volunteers upon whom the whole structure depends. The way in which these volunteers have responded to the increased burden and new problems is beyond praise. The nation is greatly indebted to them.

61. *Army Emergency Reserve.* The national service content of this reserve had reached 82,900 by December 31, 1952. Nearly 65 per cent. of the 1,200 units required have been formed, but their volunteer content

is low. We want more volunteers, especially warrant officers and serjeants. So far only one third of the required number has come forward.

62. *Territorial Army.* The Territorial Army is just over half way towards its complete build-up with national servicemen. Of these, it contained, on December 31, 1952, 131,400 as compared with 69,400 on the same date in 1951. On the other hand the number of volunteers decreased from 72,800 on December 31, 1951, to 67,400 on December 31, 1952. This is because many of the former Territorials who rejoined the Territorial Army in 1947 are now getting old and leaving. We have always recognised that in the future the Territorial Army must rely for its volunteers upon the national servicemen who have completed their part-time liability. None have so far reached that stage, but already some 29 per cent. of the national servicemen posted to the Territorial Army have become volunteers. I hope that the majority of national servicemen will serve on as volunteers after completing their compulsory liability.

63. During the year plans have been made to re-organise the Women's Royal Army Corps (Territorial Army).

#### HOME GUARD

64. Enrolment into the Home Guard started in April 1952 in Great Britain and rather later in Northern Ireland. Some 580 battalions have been established throughout the country and steady progress in recruitment and training has been made. By January 1953, 26,110 men had enrolled, and a further 21,331 were borne on the Home Guard Reserve Roll. A sound nucleus has been established on which to expand in war, but more volunteers are needed, particularly in the eastern counties.

65. As a result of experience it was decided in November 1952 to increase the establishment of cadre battalions to 100 and to decrease that of effective battalions to 300. This will enable cadre battalions to recruit enough key men to form a good foundation for their rapid build-up in war; and the strength of effective battalions in peace will now be limited to the numbers required for their immediate tasks at the outbreak of a future war. The result of all this has been to reduce the peace establishment of the Home Guard from around 170,000 to about 91,000.

66. Uniforms and greatcoats have now been authorised for all enrolled members, and arrangements are being made for an increase in training facilities next year.

#### CADETS

67. Good progress has been made in the re-organisation and the standard of training of the Combined Cadet Force and the Army Cadet Force, the combined strengths of which are at a fairly steady level. The value of the Cadet movement to the Army can be judged from the fact that since 1947, 79 per cent. of all entrants to the Royal Military Academy, Sandhurst, were ex-members of the Cadet Forces, and that since 1948 14 per cent. of all volunteers enlisting into the Regular Army were ex-Cadets.

#### THE USE OF CIVILIANS BY THE ARMY

68. I should like to mention the employment of civilian staff by the Army. The soldier's primary task is to fight and perform other functions which, for reasons of geography, experience, etc., cannot be performed

satisfactorily by men and women out of uniform. If a job can be done as well by a civilian as by a man in uniform, it is our policy to employ a civilian, subject to financial and manpower limitations and to certain other considerations of policy which I need not detail here.

69. The employment of civilians enables soldiers to be released from headquarters and static units for training and essentially military functions. They perform administrative and clerical duties and a host of other tasks, among which can be mentioned both technical and unskilled work in R.E., R.A.O.C., and R.E.M.E. installations, and such jobs as barrack cleaners, mess orderlies, batmen, cooks, transport drivers, and assisting in the administration of Reserve Army training. They are also employed in Command Signal Regiments and provide both skilled and unskilled labour for engineer works services.

70. The growth of the Army as a result of the rearmament programme has made it inevitable that the number of civilians employed by the Army should increase. By the end of 1953-54 the Army will be employing some 12,000 more civilians than it was employing in 1951-52, an increase of roughly 6 per cent. During this period we have undertaken such additional commitments as the opening of the administrative base at Antwerp, the raising of the state of operational preparedness of Anti-Aircraft Command, increases in administrative requirements in storage depots, etc., due to the impact of the rearmament programme, and the increase in the size of the Territorial Army.

## TRAINING

### ACTIVE ARMY

71. The increased intake into the Army during the past year as a result of the lowering of the minimum age for call-up of national servicemen has placed a heavy load on our basic training organisation. There have inevitably been difficulties and some temporary overcrowding, but I believe that the general standard has been maintained. In the Royal Engineers and infantry training arrangements have improved.

72. In view of the shortage of warrant officers and non-commissioned officers, which I have already mentioned, it is especially important that we should make the best possible use of the most promising of the young men who join the Regular Army. A scheme has been introduced under which extra training is given to selected regulars with the object of developing their potentialities at the earliest possible moment and giving them a start on the promotion ladder.

73. We are under constant pressure from Commonwealth and allied armies to exchange information on training matters and to assist them by allotting vacancies at our schools. During the past year some 1,750 Commonwealth and allied officers and other ranks have either attended courses or been attached to units, etc., in the United Kingdom.

74. In the field of collective training lack of regular troops has prevented any large scale exercises in this country. But advantage has been taken of the concentration of the better part of two divisions in the Canal Zone to hold major exercises on a scale not normally possible there; and large-scale manœuvres were held in Germany. Mention of these exercises has already been made in paragraphs 34 and 40.

## RESERVE ARMY

75. During 1952 a further 182,142 Z reservists were called up for refresher training. With a few minor exceptions the training was most successful. In addition to the holding of exercises with troops up to brigade level commanders and staffs of higher formations up to corps headquarters level were also exercised. Units of the 16th Airborne Division of the Territorial Army flew over to Germany and dropped with marked success and realism in exercises with the British Army of the Rhine.

76. This past year has been the first in which the training arrangements for the Army Emergency Reserve have been fully used. There have been difficulties, particularly where it has not been practicable to organise men under training into self-contained units, but on the whole results have been good. A beginning has also been made with Home Guard training and several successful exercises have been held.

## ARMAMENTS AND STORES

77. The bare maintenance costs of the Army (pay, pensions, rations, accommodation, transport, and the like) necessarily absorb the greater part of the funds allotted to the Army. We cannot appreciably reduce these maintenance costs without either an adverse effect on the conditions of service or a diminution in the size of the Army. The reduction in our planned defence expenditure has had to be effected without any reduction in commitments, and hence the size of the Army has had to be maintained. It follows that the rate at which new equipment can be provided and reserves built up has had to be slowed down.

78. *Tanks.* The Centurion has enhanced its reputation. As a result orders have been placed by the United States for considerable numbers of these tanks to equip North Atlantic Treaty Organisation forces. We have also had substantial orders from Commonwealth countries and enquiries from foreign countries which we hope will result in further sales. Adequate supplies for the Active Army are available and this year we propose to issue Centurion tanks to part of the Territorial Army for their training. In the meantime we are continuing our efforts to develop still further the tank as a weapon of war.

79. *Other Armoured Vehicles.* A new scout car and a new armoured wheeled personnel carrier will come into full production this year and issues to our own forces will begin.

80. *Infantry Weapons.* We have made much progress on the re-armament of the infantry, especially in the field of anti-tank weapons. A complete family of new weapons has been evolved and is being manufactured and issued to our infantry units.

81. The smallest member of this family is the anti-tank grenade which is projected from the standard Service rifle. Although this grenade weighs only 21 ounces its destructive capacity is equal to that of the most powerful infantry anti-tank guns used in the last war. Any soldier can be taught quickly how to use it.

82. In the infantry platoon the American 3.5-inch rocket launcher has been adopted and is now in full production in the United Kingdom, complete with its ammunition. This also is a light weapon and, although comparatively short-ranged, is extremely powerful.

83. At battalion level a new anti-tank gun has been designed to replace the existing one. This gun is a recoilless weapon and is probably the most powerful used by any infantry in the world to-day. It is lighter and more easily manœuvred than the existing guns; full production is already under way and the re-equipment of the Regular Army will start this year.

84. In the small arms field joint British, Canadian, and Belgian development should shortly produce a cartridge acceptable to all the North Atlantic Treaty Organisation countries, together with a rifle on the general lines of the .280. I hope that a decision on this important problem will be reached during the year. Meanwhile, the Patchett machine carbine has been designed and is undergoing wide-scale troop trials. This is intended as a replacement for the Sten and has so far passed all its trials extremely well.

85. *Guided Weapons.* The study and design of guided weapons has continued; these show great promise and will be vastly superior to the present orthodox types of weapons.

86. *Bridging.* A new assault floating bridge and a new heavy assault ferry have been developed and we shall start equipping the Army with them during the year.

87. *Body Armour.* Body armour of American design and manufacture has been issued on a limited scale to our troops in Korea so as to gain experience of this equipment. This experience has been sufficiently encouraging to justify our starting production in this country.

88. *Radiac Instruments.* A range of instruments to detect the presence of radio-active matter has been developed so that our troops can take defensive action should they encounter atomic weapons. Production of these instruments will be started this year.

### WORKS AND QUARTERING

89. The Army badly needs more and better accommodation for troops, but we have not the money to do much to improve things. We are also restricted at home by the limited labour and material available for all new building, both public and private. Our main effort must be devoted to the continuation of works essential to the rearmament programme, and the replacement of war-time hutting at home and tented camps and huts overseas where permanent barracks cannot yet be provided. One thing has particularly struck me—the bad condition of, and urgent need of more maintenance work on, Army buildings. I hope that we shall be able to do something to improve things next year.

### HOME

90. The bare essentials for anti-aircraft defence will be completed during the coming year. We are also making good progress with the building of additional covered storage. This is required not only to house the products of the re-armament programme, but also to make good the deficiencies which were found to exist after the war. The building of new training centres for the Territorial Army and the modernisation of existing centres is limited by shortage of money.

91. We are continuing to build married quarters, most of which are

financed under the Armed Forces (Housing Loans) Act, 1949. In addition modern buildings are being provided in substitution for hutting at four major establishments. This is a very modest start on a badly needed long-term programme for rehousing the single soldier.

#### ABROAD

92. During 1953-54 further progress will be made with building overseas. We are going on with the construction of married quarters and other improvements to accommodation in the Far East. In the Middle East building has been inevitably delayed by political uncertainty; nevertheless a new cantonment for one infantry brigade has been started in Cyprus. The main installations of the new British base near Antwerp will be completed during 1953-54.

#### MOVEMENTS

93. Although we have taken every step to limit our expenditure on movements, it has not been possible to reduce the volume of movement of men, stores, and supplies. In some cases our increased commitments overseas have caused the volume of traffic to increase. At the same time fares and freight rates continue to rise.

94. Except for the movement of whole units between the United Kingdom and commands overseas we use air transport whenever this can be done conveniently and economically. This achieves some saving in direct costs and a substantial reduction in the waste of time spent in transit and awaiting passage.

95. We have gone about as far as we can in this matter with the type of aircraft at present in use for trooping; but it is my intention to extend air trooping to the Far East on a considerable scale as soon as modern aircraft which satisfy the required conditions become available.

96. Nevertheless this does not imply that we shall dispense entirely with troopships. These are still the normal means of transport for moves of complete units, and for movement to and from the Far East, and they will continue to be required, though in fewer numbers. With the growth of air trooping we have been able to withdraw from service some of the older ships which were far from satisfactory. Certain other ships are being converted to post-war standards and by the end of this year five ships will have been thus converted.

#### GENERAL

##### DISCIPLINE

97. The standard of discipline has improved and the number of court-martial convictions in proportion to the strength of the Army has decreased, both for officers and other ranks, by as much as 30 per cent. since 1949.

##### HEALTH

98. During the past year the health of the Army has been good. At home admissions to hospitals have remained steady for the past three years, but improvements have been recorded in almost all other Commands. The British Army of the Rhine, for the first time, had a lower admission rate than the home Commands, and this was also the case in Trieste. The position in Singapore, Malaya and Hong Kong was roughly the same

as it was before 1950 (there having been some deterioration in 1950 and 1951) and in Korea there was an appreciable improvement.

99. Skin diseases are still one of the main causes of admissions to medical units, but there has been a steady decline in venereal disease in the United Kingdom and the British Army of the Rhine, a considerable fall in the Middle East, and substantial reductions in the Far East, Korea and Japan. The incidence of malaria continues to be low in all theatres. A considerable outbreak of paratyphoid fever involving some 200 cases occurred in the Canal Zone. The cases were not serious and no deaths occurred. The cause of the outbreak is still being sought.

100. *Medical Discharges.* Because of the introduction of a new system of medical documentation and certain other changes the figure of discharges from the Army on medical grounds cannot be directly compared with those of previous years. The tendency is, however, towards a reduction in the total discharge rate. The rate for accidental injuries remains unchanged, and there has been a fall in the discharges for tuberculosis.

101. *Research.* Research continues on the medical problems of atomic, biological, and chemical warfare, and also into the causes and prevalence of skin disease in the Middle East. Efforts have been made to improve the efficiency of the T.A.B. vaccine in use in the Army. Close contact has been maintained with the Medical Research Council in connection with the establishment of an Army Physiological Research Unit.

#### EDUCATION

102. The Army Education Scheme tries to cover the particular needs of the soldier as a soldier, a citizen and an individual. It caters for a very wide range of pupils from the illiterate to the university student and, as far as possible, provides for the Army facilities similar to those available in civil life.

103. The general education syllabuses aim at giving men and women the skill and background knowledge which they require at their own particular level or in the rank they are trying to attain. The syllabuses progress upwards through the three Army Certificates of Education, to the new General Certificate of Education examination for the forces. From July 1953 this examination will be administered by Cambridge University and will, like its predecessor the Forces Preliminary examination, be open to the Army at home and overseas. Similar facilities are provided by special education schemes for colonial troops and locally enlisted forces, with particular emphasis upon literacy in their own language or in English. Individual education, which includes a wide range of correspondence courses, provides facilities at all levels for particular interests and studies outside the general scheme and makes an important contribution to the mental and moral well-being of the soldier.

104. I should also like to mention the special courses lasting 12 weeks each which are given at five Preliminary Education Centres in the United Kingdom for illiterates or near-illiterates. By means of these courses some 1,400 recruits a year who would otherwise be rejected are being raised to a standard of education enabling them to be accepted into the Regular Army.

105. *Children.* The responsibility of my department for children's education increased very considerably on April 1, 1952, when the War



Office took over from the Foreign Office the control of the British Families Education Service in the British Zone of Germany. There are 83 schools there, accommodating 8,000 children of Navy, Army, Royal Air Force, and Control Commission personnel in the British Zone. In the remaining commands overseas there are some 70 army children's schools with over 5,800 pupils (4,400 primary and 1,400 secondary).

106. Primary education in army children's schools overseas compares well with that provided in similar schools in the United Kingdom. But I am not yet completely satisfied with the standard of secondary education.

#### RESETTLEMENT

107. Resettlement information and advice service is given by the Army and the Ministry of Labour and National Service. Towards the end of his service the regular can apply to attend a special 28 days' course at one of the Army's Higher Education Centres in preparation for his intended job or for one of the vocational training courses run under the Ministry of Labour. As a result of these facilities and the help we get from industry and other Government departments, employment for ex-soldiers is most satisfactory, except in some cases of older officers.

#### ENTERTAINMENT

108. The Army Kinema Corporation continues to give a world-wide service of training and entertainment film exhibitions. There are 147 Army Kinema Corporation cinemas in operation in addition to 72 mobile equipments and 14 troopship installations. Attendances are estimated to reach 16,750,000 for 1952-53, which is an increase of 3,250,000 over the previous year.

109. Professional artistes visit the forces serving in Germany, Austria, Trieste, the Middle East, Malaya, Korea, and Hong Kong. The standard and number of shows have been improved by the great help which is being given by the Combined Services Entertainment Advisory Committee consisting of leading members of the theatrical profession. This was formed in 1952 and is a voluntary Committee which advises and assists in the provision of artistes. It is doing excellent work.

110. The Forces Broadcasting Service provides programmes for overseas stations which are not otherwise served by suitable wireless programmes.

#### N.A.A.F.I.

111. The Navy, Army and Air Force Institutes continue to cater for British troops wherever they serve. During the past year they have overcome in a most praiseworthy manner the difficulties created in Egypt by the abrogation of the 1936 Treaty and have succeeded in maintaining a good service there. They continue to serve the British Army well in the operational areas of Korea and Malaya.

#### VOLUNTARY PHILANTHROPIC ORGANISATIONS

112. The voluntary philanthropic organisations continue to render invaluable service to the Army in spite of their own financial difficulties, and I am glad of this opportunity to acknowledge the great help which we receive from them, especially overseas. They are very popular with the Army.

## THE EAST COAST FLOODS

113. In concluding this memorandum I should like to mention the work done by the Army in connection with the East Coast floods. Very prompt action was taken and rescue work began on the night the floods started.

114. At one time 11,000 officers and men were employed directly on this work. Nearly 1,600 Army vehicles (including 60 amphibious vehicles) were in use, together with 65 heavy earth-moving machines and nearly 300 boats. Material for making 12,000 yards of improvised roads were used, and no fewer than 17,000,000 sandbags were issued from Army stocks.

115. Apart from the main job of filling the breaches in the sea walls, soldiers were engaged on a variety of tasks—making roads, evacuating refugees and livestock, running first aid posts, recovering civilian vehicles, illuminating night work by searchlight, and so on. They worked day and night, often in conditions of hardship and discomfort, and richly deserve the tributes which have been paid to their prompt and effective assistance.

ANTONY HEAD.

THE WAR OFFICE,  
*February 18, 1953.*

# ABSTRACT OF ARMY

Vote	Service	Estimates, 1953-54		
A	Maximum number of officers and other ranks to be maintained for Army Service.		554,000	
		Gross Estimate	Appropriations in aid	Net Estimate
1	Pay, etc., of the Army .. ..	139,390,000	13,100,000	126,290,000
2	Reserve Forces, Territorial Army, Home Guard and Cadet Forces	18,470,000	180,000	18,290,000
3	War Office .. ..	3,070,000	50,000	3,020,000
4	Civilians .. ..	61,280,000	1,190,000	60,090,000
5	Movements .. ..	35,420,000	350,000	35,070,000
6	Supplies, etc. .. ..	67,870,000	14,260,000	53,610,000
7	Stores .. ..	244,000,000	68,500,000	175,500,000
8	Works, buildings and lands ..	36,560,000	4,160,000	32,400,000
9	Miscellaneous effective services ..	7,080,000	3,260,000	3,820,000
10	Non-effective services .. ..	18,130,000	220,000	17,910,000
11	Additional married quarters .. ..	5,500,100	5,500,000	100
	Total .. ..	£ 636,770,100	110,770,000	526,000,100

ESTIMATES, 1953-54

Estimates, 1952-53			Difference on Net Estimates	
		555,000	Decrease 1,000	
Gross Estimate	Appropriations in aid	Net Estimate	Increase	Decrease
126,200,000	16,400,000	109,800,000	16,490,000	£ —
18,360,000	160,000	18,200,000	90,000	—
3,230,000	50,000	3,180,000	—	160,000
50,300,000	1,800,000	48,500,000	11,590,000	—
29,550,000	250,000	29,300,000	5,770,000	—
61,180,000	13,280,000	47,900,000	5,710,000	—
234,000,000	48,000,000	186,000,000	—	10,500,000
35,750,000	5,250,000	30,500,000	1,900,000	—
4,970,000	3,570,000	1,400,000	2,420,000	—
16,930,000	210,000	16,720,000	1,190,000	—
5,500,100	5,500,000	100	—	—
585,970,100	94,470,000	491,500,100	45,160,000	10,660,000
Net increase .. ..			£34,500,000	

ANTONY HEAD  
J. R. H. HUTCHISON

JOHN HARDING, *C.I.G.S.*  
H. REDMAN, *V.C.I.G.S.*  
A. D. WARD, *D.C.I.G.S.*

G. W. TURNER

War Office,  
February 10, 1953



MEMORANDUM BY THE  
SECRETARY OF STATE FOR AIR TO ACCOMPANY  
AIR ESTIMATES, 1953-54  
(Cmd. 8771)

PREFACE

1. THE NET total of Air Estimates for 1953-54 is £498,000,000. This allows for the receipt of £50,000,000 in consequence of the grant of defence support aid by the United States of America towards some of the burden of defence undertaken by the United Kingdom in the common cause. The corresponding figures for 1952-53 were £437,640,000 and £30,000,000, respectively.

2. After defence support aid in both years has been deducted, the net total for 1953-54 is £80,360,000 more than for 1952-53. Broadly, the increase results from the continued expansion and re-equipment of the Royal Air Force, from increases in prices, and from provision for services hitherto provided from other funds.

GENERAL

3. The distribution of expenditure reflects the stage now reached under successive plans for the strengthening of the Royal Air Force. The development of airfields and the expansion of the organisation for training aircrew and ground tradesmen have had to march a step ahead of the expansion of the front line. The peak of the Royal Air Force works programme has now been passed, and during the year the training organisation will begin to contract. In consequence, there will be slight reductions in expenditure on works and, after allowing for the allocation of more men to the front line, in expenditure on pay and allowances (*see* paragraph 19 below). In contrast, the industrial preparations made over the past two years are showing results in increased expenditure (after allowing for increased prices) on aircraft, ammunition, electronic equipment and instruments, for the expansion of the force and its re-equipment with modern weapons. There will also be increased expenditure on liquid fuel and, though part of this is accounted for by increased duty, the main cause is that the force will be larger and more powerful.

4. The increase in expenditure on aircraft would have been greater if the Government had not decided, as part of its review of the £4,700 million programme announced by the previous Government two years ago, to concentrate on the production of the most advanced types of aircraft and equipment for the Royal Air Force and to reduce purchases of the less advanced. This decision naturally slows down the rate of expansion of the force, but the expansion will still be considerable.

5. A major expansion of this kind, coinciding with the introduction of new weapons and their accompanying tactical developments, places a heavy strain on the officers and men of the force, especially since at the start of the expansion the general level of experience among officers and non-commissioned officers was inevitably less than before the war, and the difficulties left by the post-war contraction and reorganisation had not

disappeared. The standards of training, serviceability of aircraft, and administrative efficiency have, however, not merely been maintained, but improved.

6. During 1952, additional operational aircraft were brought into service in Commands at home and overseas, and the number of flying hours was one-third greater than during the previous year. The largest single expansion was in the 2nd Allied Tactical Air Force, where the Royal Air Force, under the Supreme Allied Commander in Europe, is now directly associated with squadrons of the Belgian Air Force and the Netherlands Air Force.

7. Both day and night fighter forces in Fighter Command will continue to expand throughout the coming year, which will see the introduction into the Royal Air Force of the first British-built swept-wing day fighters. The first type in operational service will be the Swift and all preparations have now been completed to bring it into squadrons as aircraft become available. In addition to the aircraft which the Canadian and United States authorities are providing for the Royal Air Force on the Continent, a most welcome offer of F.86 Sabres under the United States Mutual Security programme will provide for further valuable re-equipment in Fighter Command during 1953.

8. In Bomber Command, more squadrons of Canberra jet bombers have been formed and the expansion of the Canberra bomber force will be greatly accelerated during 1953-54. The coming year will also see the re-equipment with Canberra aircraft of the photographic reconnaissance squadrons. Coastal Command has been strengthened by the formation for maritime operations of new squadrons equipped with Shackletons and Neptunes.

9. On the Continent, Royal Air Force squadrons of the 2nd Allied Tactical Air Force are now receiving Venom fighter-bombers, to replace the present Vampires, and all the day fighter/ground attack squadrons are to be equipped with the new aircraft during the year. There has also been a substantial reinforcement of our Meteor night fighter force in Europe. The ferrying of Sabres from Canada, via Greenland and Iceland, began in December 1952, and will continue throughout the coming summer. The first Sabre squadrons will shortly be forming in the 2nd Allied Tactical Air Force, where, by the end of the year, a substantial day fighter force will have been built up. The Royal Air Force is greatly indebted for the supply of these aircraft to the generosity of Canada and the United States.

10. The operational Commands of the Royal Air Force have taken part in several large-scale exercises during the past year. The re-equipment of Bomber Command with fast, high-flying Canberras has had an immediate effect upon the realism of air exercises, as was apparent from the main Royal Air Force exercise of the year, Exercise "Ardent." The testing of the air defence system on this occasion involved more aircraft than have ever before taken part in an exercise over the United Kingdom. During the year, aircraft of Coastal Command played a large part in Exercise "Mainbrace," the major exercise of the North Atlantic Treaty powers in maritime defence. In Europe, aircraft of the 2nd Allied Tactical Air Force took part in Exercise "Holdfast," in conjunction with troops of the British Army of the Rhine and allied forces.

11. An outstanding good-will and training mission was undertaken by

Bomber Command, when four Canberras flew to South and Central America, visiting eleven foreign countries and four British Colonies while overseas. The Canberras were welcomed enthusiastically wherever they went and gave impressive demonstrations. Sunderlands of Coastal Command established the British North Greenland Expedition at their base camp last August and Hastings of Transport Command assisted in the establishment of the Expedition's ice-cap station. In so doing, Royal Air Force aircrew gained valuable operating experience.

12. During the flood disasters in this country and in Holland, the Royal Air Force rendered valuable assistance, both on land and by air. In this country, more than 4,000 personnel, from all Commands, helped to dam the breaches in the sea walls and to rescue the homeless, while Royal Air Force stations provided food, transport, and temporary accommodation for several hundred flood refugees. In Holland, 500 men of the Royal Air Force Regiment were sent to assist in flood relief, and Valettas of Transport Command dropped dinghies and supplies. Aircraft of Transport and Coastal Commands also brought from abroad nearly three million sand-bags. Air and photographic reconnaissance of the affected areas in both countries was carried out by aircraft of Bomber Command and the 2nd Allied Tactical Air Force.

13. On Coronation Day, jet aircraft will fly past in salute to Her Majesty, and on July 15, Her Majesty will hold a Review of the Royal Air Force at Odiham.

14. The England-New Zealand air race, which is due to be held in October, will provide a valuable opportunity for training in long-range high-speed flight. The Royal Air Force have entered a Valiant and three Canberras for the race.

15. The overseas Commands of the Royal Air Force have, in close co-operation with other United Kingdom and Commonwealth Forces, been actively engaged in the support of British policy. In Malaya, operations against the terrorists have continued, in which all elements of the Far East Air Force have taken part. Helicopters have been increasingly used for casualty evacuation from the jungle, and the value of the larger S.55 helicopters for troop-carrying purposes has already been demonstrated. The timely arrival of the S.55s was made possible by the assistance of the United States Government, who advanced the supply of the helicopters allocated to the Royal Navy under military aid. Initially, the Royal Navy are manning the S.55s in Malaya, where they are operating under Royal Air Force control. In Korea, Sunderland flying boats of the Far East Air Force have continued to carry out patrols and reconnaissance, and Austers of the Air Observation Post and Light Liaison Flights have co-operated with the Commonwealth forces on the ground. Royal Air Force pilots attached to Commonwealth and United States squadrons engaged in the campaign also destroyed or damaged several MIG 15 aircraft in aerial combat. Transport Command have continued throughout the year their casualty evacuation flights from Japan and Singapore, and have undertaken a new service between Singapore and the Fiji Islands for Fijian troops wounded in Malaya. Aircraft of Transport Command also played a large part in conveying the scientists and their equipment to Australia for the testing of the British atomic weapon. In Kenya, transport aircraft brought troop reinforcements to conduct operations against



the Mau Mau. From Kenya, too, No. 82 Photographic Reconnaissance Squadron has returned to the United Kingdom after the successful completion of its five-year task of surveying the British Colonial territories in Africa, hitherto largely unmapped.

16. Co-operation with the other air forces of the Commonwealth has continued throughout the year. A notable development during 1952 was the arrival of squadrons of the Royal Australian Air Force and the Royal New Zealand Air Force to serve with the Royal Air Force in the Middle East. Squadrons of the Royal Canadian Air Force and of the United States Air Force share in the air defence of the United Kingdom.

17. There has been a small but steady expansion in Flying Training Command and the output of trained aircrew in 1952 was double the output in 1951. An improved Vampire jet trainer will be introduced in 1953, and a new piston-engined basic trainer, the Provost, will be replacing existing types.

18. There will be substantial reductions in the number of national service men to be trained as aircrew and in the scale of reserve flying training; and, as already announced, a number of civilian operated schools will be closed in consequence.

#### PERSONNEL

19. The year 1952 has been one of consolidation in all branches of the Royal Air Force rather than one of marked numerical expansion. Between April and December, 1952, the total strength rose from 271,000 to 275,000 and is expected to rise to 279,000 by April of this year. It will continue to rise for a few months, but will contract later, falling to a total of about 276,000 by the end of the financial year. The effect on expenditure of this fall in strength is counterbalanced by an increase in average rates of pay, resulting from a lower proportion of national service men; on the other hand the cost of marriage allowance is expected to fall, and the net effect is a decrease of £1,680,000 under Vote 1.

20. Whilst there is not an overall shortage of men in the Royal Air Force, there is still a serious deficiency of highly skilled men in some of the most important trade groups. Even if recruits are forthcoming in sufficient numbers, lack of experience can only be made good by the passage of time, but at the moment new recruits and men already in the Service are reluctant to enter into engagement for five or more years and the number re-engaging for pension is still unsatisfactory. Advanced training is therefore being given to a considerable number of men on short engagements and there are under consideration proposals designed in the long term to increase the technical skill and experience on which the efficiency of a modern air force so largely depends.

21. The number of pilots and navigators entering regular service during the years was satisfactory. But more applicants of the highest quality are needed, able to sustain the heavy responsibilities of the Royal Air Force as the first line of the nation's defences.

22. It is now possible for extended service or short service General Duties officers to receive permanent commissions for employment mainly on flying duties up to the age of about 43, and afterwards on ground duties until their retirement at the age of 50 or over. They will have the prospect of rising to the rank of Squadron Leader.

23. The intake of boy entrants in 1952 reached the very satisfactory total of 1,783. The number of apprentices who joined the Service during the year was 980; this is slightly less than in 1951. The high standard of service and educational training which is maintained for apprentices continues to be justified by the value of their contribution to all aspects of the Service, and several former apprentices are now holding high appointments in the Royal Air Force.

24. The new Technical Cadet Scheme has been launched successfully. Under this scheme, young men with appropriate educational qualifications are granted permanent commissions in the Technical Branch after a course of training that includes a three-year honours degree course at a university.

25. During the period April–December, 1952, over 40 per cent. of the young men registering for national service put the Royal Air Force as their first choice. A total of some 25,000 national service men—about 46 per cent. of those accepted—transferred to regular engagements in the Royal Air Force. Of these, nearly 16,000 signed on for three years and the majority of the remainder for four or five years; only a very small proportion accepted long engagements for 10 or 12 years.

26. The rate of recruiting for the Women's Royal Air Force has shown a slight decrease on the previous year. This is partly attributable to the disappointingly smaller number of new applicants who reach the required standards.

27. More medical and dental officers joined the Service on national service and short service commissions than in 1951, but the shortage of regular officers, from whom specialists are drawn, continues to cause concern.

#### AUXILIARY AND RESERVE FORCES

28. Two new Fighter Control Units and one Radar Reporting Unit are being added to the Royal Auxiliary Air Force.

29. A start has been made at some of the University Air Squadrons in giving training in technical and airfield construction duties. Some of these squadrons are already providing instruction in navigator and fighter control duties, in addition to pilot training.

30. The Air Training Corps has kept up its numbers and the Royal Air Force Sections of the Combined Cadet Force have steadily grown larger. Further use of flying club facilities is being made to give flying experience to cadets.

#### WORKS

31. Good progress has been made in the construction of airfields and accommodation for the expanding force at home and overseas and in the development of the radar chain. Every advantage is taken of modern construction techniques to provide for the operational requirements of the Service and, at the same time, to obtain the greatest possible economies in labour and materials.

32. Particular attention is being given to economy in land and to the use of land at airfields for agriculture.

33. New and more economical designs of married quarters have been introduced. About 3,000 quarters at home and about 500 abroad will

have been completed during the year. The number under construction has, however, declined, because of uncertainty about the availability of funds after the exhaustion of the Air Ministry's share of the armed forces' housing loan. It is intended to seek the authority of Parliament for additional loan money in due course; in the meantime, provision for all expenditure on married quarters during the year has been made under Vote 8.

34. A large programme of work is in hand for the United States Air Force.

#### AIR TROOPING

35. The cost of air trooping on the routes for which contracts have so far been let is, in general, not more than the cost of sea transport, without taking into account the savings in the time during which personnel are non-effective while at sea. The amount of air trooping undertaken by charter companies further increased during the last year. Additional contracts have raised the air trooping proportion of the world-wide trooping task for all three Services from 25 per cent. to 49 per cent. of the personnel carried. About 85 per cent. of trooping to the Canal Zone is now done by air.

#### SUPPLY

36. The provision made for aircraft and stores represents a considerable increase over the corresponding amount in 1952-53. Fighting equipment will be received in greater quantity and of later design. Allowance, however, has to be made for the general rise in prices and for payments to contractors for work done on orders cancelled because of adjustment in the programme to meet the changes in the force referred to in paragraph 4 above. At this stage, when negotiations on the cancellations are still in progress, the amount of the payments to contractors cannot be forecast with any certainty, but the sum of £13,000,000 has been provided to meet such payments in 1953-54. As a small offset to these increases, there is a fall in the provision for certain classes of stores that can be obtained quickly when required.

37. In order to speed up the various processes connected with supply and to effect economies in manpower, mechanised recording of equipment and stores will be further extended for provisioning purposes during 1953. Economy in accommodation and manpower has also been effected by the adoption of improved methods of storage and the extended use of mechanical handling equipment. Further new and promising handling aids are now being tested with a view to their adoption in the Service.

38. Much material that is no longer required has been disposed of during 1952 in order to make room for new supplies without calling for additional storage space. No new storage accommodation of the traditional type was required in 1952 and none is being asked for in 1953. Constant attention is being given also to the urgent need for the salvage of scrap of all kinds and of scarce metals in particular.

#### METEOROLOGY

39. The Meteorological Office has continued to extend its services to the public, the Royal Air Force, civil aviation, and to the economic life of the country generally.

40. The Royal Air Force has co-operated in investigating various aspects of high-speed air currents and associated turbulence which occur at the higher altitudes used by jet aircraft. The nature of the condensation trails made by these aircraft and the processes leading to the formation of ice on aircraft have been further studied.

41. Progress has been made in the research into the formation and development of depressions and anticyclones and some applications of mathematical methods to weather forecasting are being tested on electronic computing machines. Charts of high-level winds of the world prepared a few years ago are being revised in the light of improved knowledge and further observations. Considerable work has been carried out on the planning and procedures required for civil air routes using jet aircraft.

DE L'ISLE AND DUDLEY

AIR MINISTRY,  
*February* 18, 1953.

# ABSTRACT OF AIR

Vote	Service	Estimates, 1953-54		
A	Maximum number of officers, airmen and airwomen to be maintained for Air Force service.			302,000
		Gross Estimate	Appropriations in aid	Net Estimate
1	Pay, etc., of the Air Force .. ..	£88,190,000	£2,620,000	£85,570,000
2	Reserve and Auxiliary services ..	1,691,000	1,000	1,690,000
3	Air Ministry .. .. .	4,097,000	117,000	3,980,000
4	Civilians at outstations .. ..	29,480,000	2,550,000	26,930,000
5	Movements .. .. .	13,700,000	1,000,000	12,700,000
6	Supplies .. .. .	97,890,000	7,410,000	90,480,000
7	Aircraft and stores .. ..	266,250,000	71,000,000	195,250,000
8	Works and lands .. ..	86,080,000	16,080,000	70,000,000
9	Miscellaneous effective services ..	8,890,000	2,080,000	6,801,000
10	Non-effective services .. ..	4,850,000	260,000	4,590,000
11	Additional married quarters .. ..	—	—	—
	Total .. .. .	£601,118,000	103,118,000	498,000,000

# ESTIMATES, 1953-54

Estimates, 1952-53			Differences on Net Estimates	
		315,000	Decrease 13,000	
Gross Estimate	Appropriations in Aid	Net Estimate	Increase	Decrease
89,770,000	2,520,000	87,250,000	£ —	1,680,000
1,821,000	1,100	1,819,900	—	129,900
4,012,000	112,000	3,900,000	80,000	—
28,050,000	1,930,000	26,120,000	810,000	—
12,330,000	430,000	11,900,000	800,000	—
72,165,000	5,900,000	66,265,000	24,215,000	—
215,500,000	54,500,000	161,000,000	34,250,000	—
84,400,000	10,800,000	73,600,000	—	3,600,000
3,525,000	1,460,000	2,065,000	4,745,000	—
3,870,000	150,000	3,720,000	870,000	—
5,400,100	5,400,000	100	—	100
520,843,100	83,203,100	437,640,000	65,770,000	5,410,000

Net increase .. .. £60,360,000

DE L'ISLE AND DUDLEY  
GEORGE WARD

W. F. DICKSON  
F. J. FOGARTY  
J. WHITWORTH JONES  
JOHN W. BAKER  
R. IVELAW-CHAPMAN  
J. N. BOOTHMAN

J. H. BARNES

Air Ministry,  
February 11, 1953.

## FORCES FAMILY PENSIONS

(Col. 8741).

1. It was announced in Parliament on December 16, 1952, that Her Majesty's Government had reviewed awards to widows and children of regular members of the Forces. This statement relates to awards given in respect of service ("ordinary" pensions) and not to pensions payable to the dependants of those whose death is due to service ("attributable" pensions).

2. The present scheme, which applies only to officers and Warrant Officers Class I, has been in existence for well over a century. Certain of its features are out of date and the basic rates of the scheme have not been improved for many years, although increases have been given in cases of hardship under the successive Pensions Increase schemes.

3. The widows' pension scheme was not revised after the recent war. In accordance with Government policy that new and improved family pensions schemes should be provided for in part at least by contributions by the employees concerned, the possibility of a contributory widows' pension scheme for the Forces was explored. It was, however, found that the application of the contributory principle to the Forces, with their special terms of service, presented great difficulties. It has therefore been decided on this occasion that the new scheme should be on a non-contributory basis, as with previous widows' and dependants' pensions schemes for the Forces. Her Majesty's Government wish it to be understood that this exceptional step does not imply that they contemplate any other departure from their general policy stated above.

4. The new non-contributory scheme announced on December 16, 1952, covers long-service other ranks as well as officers and Warrant Officers Class I. It will apply to such personnel who have given full-time service since August 31, 1950. Details are given in Appendix I.

5. For officers and Warrant Officers Class I whose service terminated on or before August 31, 1950, the present scheme has been improved. A number of conditions, including the means test, have been abolished. This will admit to entitlement a number of widows previously excluded. The rates of pension have been increased to the level of the new scheme, and will not qualify for increases under the Pensions Increase schemes which they are regarded as superseding for the pensioners concerned. Details are given in Appendix II.

6. Pensions and increased pensions becoming payable both under the new scheme, and under the revision of the old scheme, will have effect from December 1, 1952, or the date of qualification if later.

7. In addition to improved pensions, an entirely new benefit will be given in the form of a gratuity to the widow of a regular member of the Forces who dies while serving. This new benefit will be payable to the widows of those whose death whilst serving occurred after August 31, 1950. Details are in Appendix III.

8. Changes in the terms of service of State servants normally apply only to those who are serving when the change is made. In the special circumstances, however, the Government have decided to implement the new scheme and the revision of the existing scheme from the dates mentioned above.

9. New and reassessed awards as a result of these changes will be issued as soon as is practicable.

*(For convenience, Army ranks are given in these Appendices, except where they are inapplicable. The terms apply to corresponding ranks in the Royal Navy and Royal Air Force. They do not apply to personnel locally recruited overseas.)*

## APPENDIX I

## FORCES FAMILY PENSIONS: NEW SCHEME

This new scheme applies to the families of regular personnel who give service, on the active list in the case of officers, and on long service engagements in the case of other ranks, after August 31, 1950.

RATES OF PENSION, AND CONDITIONS AS TO SERVICE  
AND RANK

## A. FAMILIES OF PERMANENT REGULAR OFFICERS

<i>Widows</i>					Old Basic Rate		New Rate	
Rank of husband—					£		£	
Field Marshal	..	..	..	..	300	a year	500	a year
General	..	..	..	..	225	"	425	"
Lieutenant-general	..	..	..	..	187	10 "	350	"
Major-general	..	..	..	..	150	"	300	"
Brigadier	..	..	..	..	120	"	250	"
Colonel	..	..	..	..	100	"	220	"
Lieutenant-colonel	..	..	..	..	90	"	180	"
Major	..	..	..	..	70	"	140	"
Captain	..	..	..	..	50	"	110	"
Lieutenant	..	..	..	..	45	"	110	"
Senior Commissioned Officer (Branch List)								
(Navy); Flying Officer (Branch List)								
(R.A.F.)					45	"	90	"
Commissioned Officer (Branch List) (Navy)					35	"	80	"
<i>Children</i>								
Officers (all ranks including Senior Com-								
missioned Officers (Branch List) (Navy),								
and Flying Officers (Branch List)								
(R.A.F.))					16	"	32	"
(If motherless)					25	"	50	"
Commissioned Officer (Branch List)								
(Navy)					12	"	26	"
(If motherless)					20	"	45	"

The minimum period of service required will be as for service retired pay, viz. normally 20 years, or 10 years if the officer is invalided (or died whilst serving).

The assessment of rank (including credit for paid acting and temporary rank) will also be as for service retired pay.

*(Sections B, C, D, and E of Appendix I give details applicable to certain officers in special categories.)*



## GENERAL CONDITIONS FOR AWARD, ETC.

The marriage must have taken place before retirement or discharge (or, where there is subsequent re-employment entitling the member to a revision of his service retired pay or pension, before the termination of the re-employment).

There will be no condition relating to income, or to the relative ages of husband and wife, or to the husband's age on marriage. If the wife was separated from her husband and not fully supported by him, and in certain other circumstances, awards will be discretionary, as hitherto.

The pensions will not be payable in conjunction with awards by the Ministry of Pensions in respect of death due to service.

A widow's pension will cease on her remarriage, but, if she again becomes a widow, the award may be resumed at discretion.

Children's pensions will be given where the widow is (or would, if living, have been) eligible for pension. In addition to children of the officer or other rank, adopted children and step-children will, subject to certain conditions, be eligible. Pensions will be payable normally up to age 18 in respect of the children of officers and Warrant Officers, Class I, and up to age 16 in respect of the children of lower ranks, but may be paid beyond those ages in certain circumstances (*e.g.* during further education).

## APPENDIX II

IMPROVEMENT OF EXISTING "ORDINARY"  
PENSION SCHEME

The existing "ordinary" pension scheme will continue to apply to the families of permanent regular officers and Warrant Officers, Class I whose service terminated before September 1, 1950, but with the following improvements:

- (a) The rates payable will be increased to the new rates set out in "A" and "D" of Appendix I.
- (b) The conditions relating to income, to the difference in age between husband and wife, and to the husband's age on marriage will no longer be enforced, and
- (c) The condition requiring marriage to have taken place before retirement or discharge will be relaxed so as to allow pension in cases in which there was re-employment (reckoning for revision of service retired pay or pension) after the date of marriage.

## APPENDIX III

## GRATUITIES TO WIDOWS, ETC.

This is a new benefit for the widows of regular officers and other ranks who die while serving after August 31, 1950 (including those serving on short service or extended service commissions and engagements).

The amount of the gratuity will be as follows:

A. OFFICERS	<i>Amount of Widow's Gratuity</i>
(i) Where a Terminal Grant would have been payable on invaliding—With 20 or more years' reckonable service (less £45 for each year or part of a year short of 20 years)	£900
Minimum with 10 years' reckonable service . .	£450
(ii) Where no Terminal Grant would have been payable	£200

## B. WARRANT OFFICERS CLASS I AND LOWER RANKS

(i) Where a Terminal Grant would have been payable on invaliding :

				<i>Amount of Widow's Gratuity</i>	
				<i>For the first 22 years' reckonable service</i>	<i>Addition for each further year's reckonable service</i>
<i>Rank (assessed as for terminal grant)</i>				<i>£</i>	<i>£</i>
Warrant Officer Class I	..	..		250	20
Warrant Officer Class II	..	..		230	18
Staff Sergeant	..	..		215	16
Sergeant	..	..		165	15
Corporal	..	..		125	12
Private	..	..		75	10

For service of 12 or more years but less than 22, a proportion of the 22 year gratuity will be payable. Where this proportion is less than £75, the gratuity will be brought up to that figure.

(ii) Where no Terminal Grant would have been payable, the widow's gratuity will be £40.

Normally the gratuity will be payable in full to the widow. It may, however, be withheld or reduced where the widow was separated from and not dependent on her husband. Where there are children not dependent on the widow, part of the gratuity may be withheld from her and paid for the benefit of the children.

Where there are children but no widow, the gratuity may be paid in part or in whole, for the benefit of the children.

Children dependent on regular women members of the Forces who die while serving will similarly be eligible for gratuities in certain circumstances.



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